ENVIRONMENTAL ASSESSMENT BOARD

VOLUME: 124

DATE: Tuesday, August 15th, 1989

BEFORE: M.I. JEFFERY, Q.C., Chairman
E. MARTEL, Member
A. KOVEN, Member

FOR HEARING UPDATES CALL (TOLL-FREE): 1-800-387-8810

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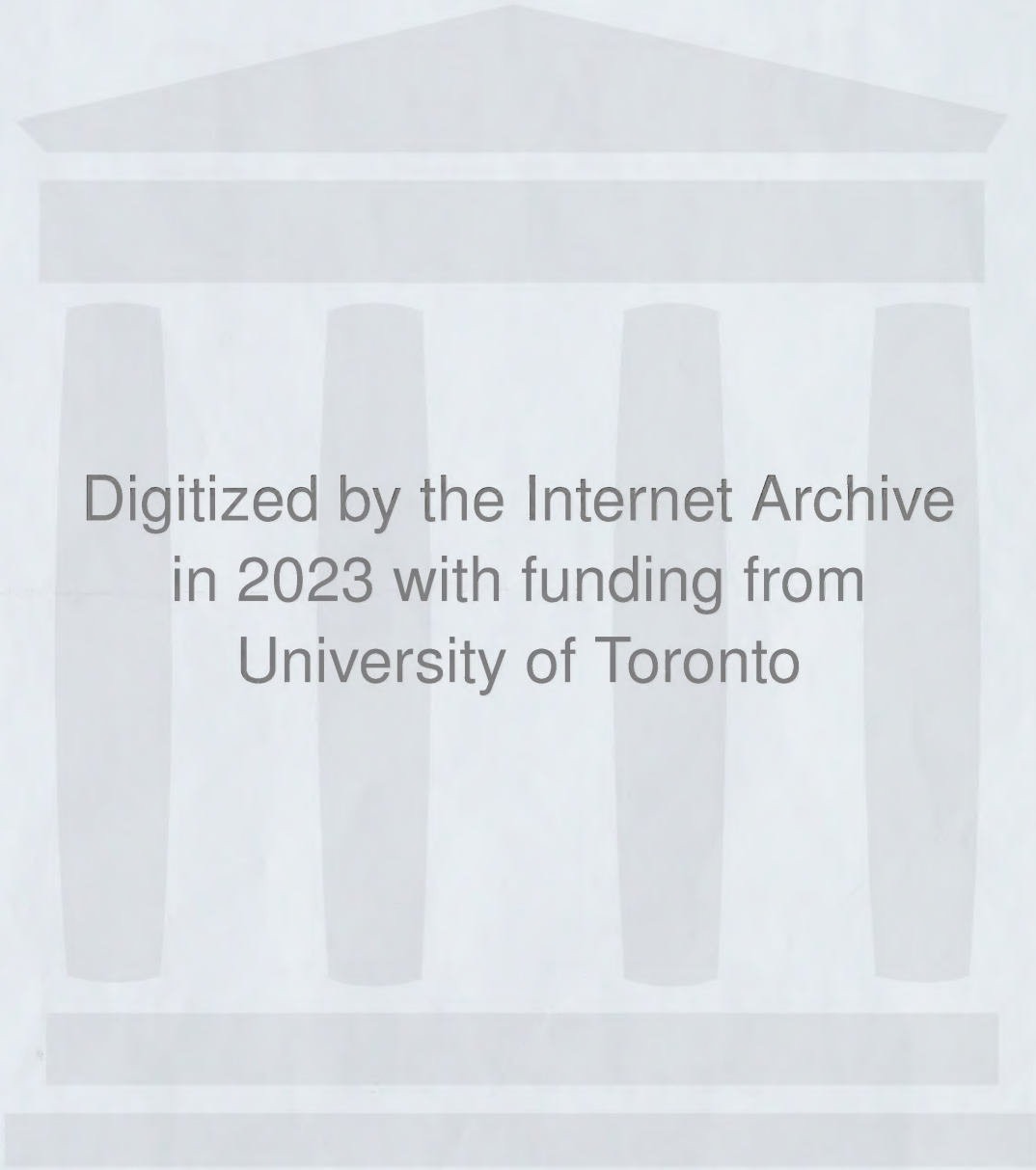

Ontario

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EA-87-02

HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental Assessment for Timber Management on Crown Lands in Ontario;

- and -

IN THE MATTER OF a Notice by the Honourable Jim Bradley, Minister of the Environment, requiring the Environmental Assessment Board to hold a hearing with respect to a Class Environmental Assessment (No. NR-AA-30) of an undertaking by the Ministry of Natural Resources for the activity of timber management on Crown Lands in Ontario.

Hearing held at the Ramada Prince Arthur Hotel, 17 North Cumberland St., Thunder Bay, Ontario, on Tuesday, August 15th, 1989, commencing at 9:00 a.m.

VOLUME 124

BEFORE:

MR. MICHAEL I. JEFFERY, Q.C.	Chairman
MR. ELIE MARTEL	Member
MRS. ANNE KOVEN	Member

A P P E A R A N C E S

MR. V. FREIDIN, Q.C.) MS. C. BLASTORAH) MS. K. MURPHY) MS. Y. HERSCHER)	MINISTRY OF NATURAL RESOURCES
MR. B. CAMPBELL) MS. J. SEABORN)	MINISTRY OF ENVIRONMENT
MR. R. TUER, Q.C.) MR. R. COSMAN) MS. E. CRONK) MR. P.R. CASSIDY)	ONTARIO FOREST INDUSTRY ASSOCIATION and ONTARIO LUMBER MANUFACTURERS' ASSOCIATION
MR. H. TURKSTRA	ENVIRONMENTAL ASSESSMENT BOARD
MR. J. WILLIAMS, Q.C. MR. B.R. ARMSTRONG MR. G.L. FIRMAN	ONTARIO FEDERATION OF ANGLERS & HUNTERS
MR. D. HUNTER	NISHNAWBE-ASKI NATION and WINDIGO TRIBAL COUNCIL
MR. J.F. CASTRILLI) MS. M. SWENARCHUK) MR. R. LINDGREN)	FORESTS FOR TOMORROW
MR. P. SANFORD) MS. L. NICHOLLS) MR. D. WOOD)	KIMBERLY-CLARK OF CANADA LIMITED and SPRUCE FALLS POWER & PAPER COMPANY
MR. D. MacDONALD	ONTARIO FEDERATION OF LABOUR
MR. R. COTTON	BOISE CASCADE OF CANADA LTD.
MR. Y. GERVAIS) MR. R. BARNES)	ONTARIO TRAPPERS ASSOCIATION
MR. R. EDWARDS) MR. B. McKERCHER)	NORTHERN ONTARIO TOURIST OUTFITTERS ASSOCIATION

APPEARANCES: (Cont'd)

MR. L. GREENSPOON) MS. B. LLOYD)	NORTHWATCH
MR. J.W. ERICKSON, Q.C.) MR. B. BABCOCK)	RED LAKE-EAR FALLS JOINT MUNICIPAL COMMITTEE
MR. D. SCOTT) MR. J.S. TAYLOR)	NORTHWESTERN ONTARIO ASSOCIATED CHAMBERS OF COMMERCE
MR. J.W. HARBELL) MR. S.M. MAKUCH)	GREAT LAKES FOREST
MR. J. EBBS	ONTARIO PROFESSIONAL FORESTERS ASSOCIATION
MR. D. KING	VENTURE TOURISM ASSOCIATION OF ONTARIO
MR. D. COLBORNE	GRAND COUNCIL TREATY #3
MR. R. REILLY	ONTARIO METIS & ABORIGINAL ASSOCIATION
MR. H. GRAHAM	CANADIAN INSTITUTE OF FORESTRY (CENTRAL ONTARIO SECTION)
MR. G.J. KINLIN	DEPARTMENT OF JUSTICE
MR. S.J. STEPINAC	MINISTRY OF NORTHERN DEVELOPMENT & MINES
MR. M. COATES	ONTARIO FORESTRY ASSOCIATION
MR. P. ODORIZZI	BEARDMORE-LAKE NIPIGON WATCHDOG SOCIETY

APPEARANCES: (Cont'd)

MR. R.L. AXFORD	CANADIAN ASSOCIATION OF SINGLE INDUSTRY TOWNS
MR. M.O. EDWARDS	FORT FRANCES CHAMBER OF COMMERCE
MR. P.D. McCUTCHEON	GEORGE NIXON
MR. C. BRUNETTA	NORTHWESTERN ONTARIO TOURISM ASSOCIATION

I N D E X O F P R O C E E D I N G S

I N D E X O F E X H I B I T S

Index of Exhibits (Cont'd)

Index of Exhibits (Cont'd)

---Upon commencing at 9:05 a.m.

THE CHAIRMAN: Good morning. Be seated, please.

Mr. Castrilli and Dr. Ritter, could I ask both of you to please slow down slightly in replying to the questions because of some difficulties in trying to keep up.

Thank you.

PETER KINGSBURY,
LEONARD RITTER, Resumed

CONTINUED CROSS-EXAMINIATION BY MR. CASTRILLI:

Q. Dr. Ritter, we are going to continue with you on the subject of glyphosate. Now, I understand your position generally is that the database available on Roundup is as good as would be on virtually any product which has been submitted to Health and Welfare Canada?

DR. RITTER: A. Yes, generally speaking that's true.

Q. And would it be fair to say that you have quite a bit of confidence in the conclusions that have been reached with respect to Roundup?

A. Yes.

Q. And you do not perceive any hazard associated with its use; is that right?

A. The data presently available to us does not suggest to me that there should be an unacceptable hazard associated with its use, that's correct.

Q. This hearing is not the first time you've made those submissions; is that correct?

A. That's correct.

Q. You made those submissions in 1988 before the House of Commons?

A. That's correct.

Q. This was on a hearing involving the study of the use of pesticides in Canada?

A. That's correct.

Q. Dr. Ritter, I am going to show you an excerpt from that hearing in which you made those comments. Will you identify that as yourself giving that testimony before the committee?

A. Yes. It is entitled: House of Commons, Tuesday, March 8th, 1988, Minutes of Proceedings and Evidence of the Standing Committee on Environment and Forestry. And the excerpt which you have provided is a transcript of my testimony to the Standing Committee of the House of Commons.

MS. MURPHY: Can you advise me whether that is the entire transcript of your testimony?

MR. CASTRILLI: No, it is not the entire transcript of his testimony to that committee, but it is the only page dealing with forestry and herbicides. If you would like the entire copy, I will make it available to you.

Mr. Chairman, I would ask that this page be made an exhibit.

THE CHAIRMAN: Exhibit 735.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 735: Excerpt entitled: House of Commons, Tuesday, March 8th, 1988, Minutes of Proceedings and Evidence of the Standing Committee on Environment and Forestry.

MR. CASTRILLI: Q. Now, Dr. Ritter, we are looking at page 24 of the House of Commons testimony you gave.

Looking at the paragraph beginning just slightly below the centre of the page where you were asked a question about Roundup by the Vice-Chairman of the committee and you begin your answer by stating the following:

"Roundup was a product heavily encumbered by IBT. "

Now, if I could just stop there. Could you confirm for me, Dr. Ritter, that IBT was a U.S.

commercial testing laboratory which produced, in the 1960s and 1970s, many studies in support of pesticide registrations in Canada and other countries?

DR. RITTER: A. Yes.

Q. Many of those studies were eventually found to be scientifically invalid by U.S. and Canadian government researchers?

A. That's correct.

Q. Now, continuing with that paragraph, you go on to say that:

"90 per cent or more of the available data on Roundup is less than seven or eight years old."

Now, stopping there. Would it be fair to say that roughly 90 per cent of the studies originally done by IBT on behalf of the manufacturer with respect to Roundup -- with respect to glyphosate, were invalid and had to be redone?

A. No, that wouldn't be fair to say.

Q. What's your estimate as to how many -- or what percentage of the studies done by IBT on Roundup were invalid?

A. I have no idea at present. Studies that were declared to be invalid were repeated. I think that's perhaps the important issue rather than

the number that may have been invalid at the time.

All invalid studies which were necessary to support the continuing health and safety evaluation were repeated, submitted and evaluated.

Q. And then the comments I attributed to you at the beginning of this questioning this morning are what constitute the remainder of that paragraph; is that right?

A. Yes.

Q. Can you confirm for me, Dr. Ritter, that the oncogenic or tumor-causing potential of glyphosate is not fully defined at this time?

A. No, I can't confirm that for you. There has been some question in the United States before the Scientific Advisory Panel of EPA and some publication which EPA has put out on that question regarding the adequacy of the cancer testing.

I certainly can't confirm it for you because I'm not sure that I agree with it. I think, in my view, the status of the cancer testing on glyphosate is relatively comprehensive and I'm certainly not convinced that additional testing on that subject would serve any useful purpose.

Q. You are aware that repeat oncogenic studies are required in mice and rats in the United

States; is that right?

A. Not really. They have been requested and it's my understanding that as recently as last week there has been a waiver issued for one of those two studies already, and that the request to repeat the second study is in fact being discussed as well.

So although you're correct if you're quoting a statement from the registration standard of glyphosate several years back in 1986, I think your assertion may be somewhat less accurate today.

Q. Let's just take a look at what is now Exhibit 729, the glyphosate reregistration document.

A. Yes.

Q. We are going to look first at page 5.

A. Yes.

Q. This is the agency's assessment in June, 1986. I am looking at the summary science statement, the last two sentences in the first paragraph which indicate that:

"According to EPA, the oncogenic potential is not fully defined at this time and that repeat oncogenic studies are required in mice and rats."

Then if I could ask you to turn to page 81, the same document. It would be Table A.

A. Yes.

Q. We are looking at the generic data requirements for glyphosate. We are looking at the heading under chronic toxicity -- or excuse me, Chronic Testing, Oncogenicity and under the column: Does EPA Have Data, the answer both with respect to rat and with respect to mouse is partially and, then in the far right-hand column -- sorry, the next to the far right-hand column, a column called Must Additional Data Be Submitted, and the answer with respect to rats and mice is also yes.

And then in -- can you confirm that for for me?

A. Yes, that's correct.

Q. And in the far right-hand column on the page the time frame for submission of this additional data is listed as 50 months in each case?

A. Yes.

Q. So that at least according to this document in 19 -- in June of 1986 that the studies would not be expected to be due or submitted until 1990; is that right?

A. That's correct.

Q. Now, you indicated some changes in that situation from what's set out in that document,

and I am wondering if you can just advise me again as to what it is your information is?

A. There are two features to this discussion that we are having on the adequacy of the cancer testing on glyphosate. The first is that you are referring here to the registration standard which, in part, resulted from the hearings of the Science Advisory Panel of the U.S. Environmental Protection Agency, a panel hearing which I attended in Washington at the time that it was conducted.

The two studies in question here are the rat and mouse. In the case of the mouse study in particular, which is where the controversy initially arose, it was on the basis of - and I refer you specifically to the top paragraph on page 6 - and if I may, Mr. Chairman, I think it would be useful if I can just read the first few sentences of that because I would like to put that into perspective for you.

"The chronic feeding/oncogenicity study in mice tested dosages of 1000, 5000 and 30,000 parts per million. Glyphosate produced an equivocal oncogenic response in the mouse, causing a slight increase in the incidence of renal tubular adenomas (a benign tumor of the kidney)

in males at the highest dose tested of 30,000 ppm."

And then it goes on to describe the results of the rat study which were essentially negative; that is, I use those terms rather loosely, without effect, the rat study was considered to have been without effect.

There is a couple of things that I would like to expand on with regards to the dosing and the nature of the equivocal result in this study.

If we proceed on to the rest of the paragraph, some of that expansion is actually elaborated on here in the position document.

"The studies were reexamined by a consulting pathologist...additional kidney tumor had been found in control males..."

I am paraphrasing slightly just in the interesting of expediency:

"...data were submitted indicating that an additional kidney tumor had been found in control males...The Agency then requested that additional kidney sections from the mouse study be prepared and examined. The resultant microslides were

examined by a number of pathologists. These examinations revealed no additional tumors, but confirmed the presence of the tumors identified in the original report. The apparent lesion in the control kidney was not present in any of the additional sections. After examination of the slides, the Agency concluded that this lesion did not "represent a pathophysiologically significant change"."

There are two or three things I would like to say about this paragraph. 30,000 parts per million is about the highest high dose I have ever seen tested in any cancer study I have ever examined in the 12 years in which I have been doing this.

In fact, one could advance an argument toxicologically that the study may be in part questionable, not because the dosing was not high enough, but rather because at 30,000 parts per million the top dose may actually have affected the nutritional status of the animals; that is, one may have actually begun to substitute nutrients for glyphosate. Generally speaking, doses of this level are to be avoided because of that possibility.

In that context, I suggested to you that I think it would be inappropriate and totally without purpose to redo this study at higher doses still, particularly because at this dose the nutritional status of these animals may have been compromised.

In addition, I think that's noteworthy because even at this heroic dose the only effect that was noted was a singular increase in a single benign tumor in a single sex in a single study of a single species. And the weight of evidence context, the one in which we and the rest of the world tend to evaluate cancer studies, this kind of a singular observation in the absence of any mutagenic activity and the absence of any concurrent positive result in either the other sex or the other species would generally be dismissed.

Given that information that I've suggested to you, I can't really see the point in requiring that this study be redone, and I certainly disagreed with the position that the Environmental Protection Agency took with regards to that study, and I made my position on that clear at a number of different occasions including the Standing Committee of the House of Commons.

Q. That's fine. Just turning back to page 83 of the same document, these are the footnotes

that apply to the summary of studies in Table 5?

A. Yes.

Q. Table -- excuse me, Footnote 7, which is in relation to the rat study, indicates that:

"A repeat study is required in which the highest dose tested is a maximally tolerated dose."

What do you understand that to mean, Dr. Ritter?

A. Maximum tolerated dose is a phrase which is used in toxicology to try to impart a sense about the kinds -- about the criteria which one should use in selecting the high dose for a study. There was -- with regards to the rat study as there was with the mouse study which we have just discussed, there was some question as to whether or not the high dose in the rat study had been sufficiently high.

Again, as was the case in the mouse study, there was considerable discussion about that and certainly we were not convinced that any incremental addition to the top dose which had been used in the rat study would provide any overall benefit in terms of the information which one might extract when it was complete.

In other words, even if one could repeat

that rat study increasing the top dose, let's say by 10 per cent, that would be relatively uninformative. Unless one could contemplate that that top dose could be increased by perhaps an order of magnitude, it would be largely a waste of time and money, in our view, to repeat it, and that was the sense as to the increase in dose which might be anticipated if the study were repeated.

What I am trying to say is that the intent, when one requests that these kinds of studies be repeated - and we certainly have requested that cancer studies be repeated many times - is not to increase the dose by a mere 5 or 10 per cent; that's relatively pointless. If one can't increase it very substantially one has to question, in my view, very seriously what the practicality of repeating that study is.

And in this particular case, given the information that was already available from both the mouse and the rat, both of which were essentially negative results, we could not see what the point would be in repeating those studies. We really didn't feel that repeating those studies would in any way materially contribute to our understanding of the oncogenicity of glyphosate, and that's a position we

continue to stand by today.

Q. So Canada has not requested that repeat studies be done?

A. That's correct.

Q. And, to your knowledge, U.S. EPA has continued with this position?

A. No. As I indicated to you, it is my understanding as recently as last week that there has been a waiver issued for at least one of these requests, one further consultation in the United States and that at the request for the repeat of the second study is in - how shall I put it - discussion, negotiation as well; that is, EPA is reflecting on the position it initially took with regards to the need to repeat these studies. When I say need, I am really referring to the biological objective of repeating these studies.

Q. That's fine. Now, these studies were conducted in -- or the ones that they do have were conducted in glyphosate; is that right?

A. That's correct.

Q. Would you agree that long-term health testing has not been done on Roundup or Vision?

A. Yes.

Q. So we have no data on the

carcinogenic potential of Roundup; is that right?

A. No, I didn't say that. You asked if long-term studies had been done on Roundup. There is a variety of components in the Roundup formulation, many of which have been subjected to a variety of different kinds of testing for different jurisdictions under different legislation.

Roundup per se, as I indicated during the course of my initial presentation and in the subsequent cross-examination, as a matter of routine the active ingredient alone is subjected to cancer bioassays, and I elaborated at some length as to the reason for that.

Q. That's not quite responsive to my question, though, Dr. Ritter. The question simply was: Is there data on the carcinogenic potential of Roundup?

A. And I answered that. The answer is no.

Q. There is no such data?

A. That's correct.

Q. Thank you. Can you confirm for me that there are no data on the mutagenicity of Roundup or Vision?

A. On the final formulation?

Q. Yes.

A. I believe that's correct.

Q. No data?
A. I think that's correct.
Q. Can you confirm for me that there are no data on the immunotoxic capacity of glyphosate, Roundup or Vision?
A. I'm not sure if you are aware of the fact that there are currently no acceptable protocols for evaluating the immunotoxic potential of anything, that includes pesticides and drugs.
So perhaps I would answer your question by saying, I'm not aware of any immunotoxicity studies that exist, and I should perhaps qualify that by saying, I would be unable to provide advice to anyone as to how to conduct such studies even if we wanted them because I know of no acceptable protocol by which such studies could be conducted. It is a deficiency in science rather than a deficiency in the database.
Q. That actually was my next question. It's simply -- when we looked at Exhibit 709, for example, on your list of long-term testing requirements, immunotoxicity is not one of them; is that right?
A. That's correct.
Q. Thank you.
A. Our laboratory, just as a matter of

interest, and others have been trying to do some work in developing appropriate immunotoxicity studies for chemicals of this kind. We have published some information in that regard in the last year or two, but as of the moment I know of no regulatory agency anywhere in the world that has formal test protocols in place for immunotoxic potential.

Q. Can you confirm that there are no data on the potential developmental and reproductive toxicity of Roundup or Vision formulations?

A. That's correct. The teratology and reproductive studies relate to glyphosate.

Q. Can you confirm that there are no data on the mammalian oral toxicity of Roundup or Vision?

A. You would have to clarify for me what you mean. We have extensive oral toxicity data on Roundup and Vision.

I'm not sure what you mean by mammalian oral toxicity. There are extensive acute studies on both the active ingredient alone; that is, glyphosate per se, as well as the final formulation of glyphosate in such products as Roundup.

Q. Sorry. Is mammalian oral toxicity a test requirement?

A. Mammalian oral toxicity is a philosophy, it's not a -- it didn't identify a study type. If you are referring to acute toxicity, there is extensive toxicologic data on the acute oral mammalian toxicity of glyphosate, Roundup and Vision.

Q. That's fine. Thank you.

Mr. Kingsbury, I understand that your testimony is that elimination of glyphosate residues in animals is rapid; is that correct?

MR. KINGSBURY: A. I'm not sure I testified -- my testimony -- direct testimony said that directly. I certainly made reference to a generalized statement regarding the rapidity with which these pesticides we are dealing with as a group are, in fact, eliminated once environmental exposure ceases.

Q. Page 21 and page 22 of the ESSA Document, Mr. Kingsbury.

A. I have it.

Q. The bottom of page 21, going over to page 22, states in part:

"Elimination of residues is rapid."

I presume that means residues in animals of glyphosate; is that right?

A. That's correct.

Q. And you are relying -- or the authors

of the ESSA Document, which may or may not I guess include you, are relying on this statement -- for this statement on a laboratory test in which test animals eliminated nearly all glyphosate residues within five days of a single oral dose; is that correct?

A. Yes. What I believe they are using, they are basing this statement on, on what would be basically a metabolism study with radio-labelled material fed orally to rabbits.

Q. Mr. Kingsbury, do you have Exhibit 723 available?

A. Yes, I have it in front of me.

MR. CASTRILLI: Mr. Chairman, that would be the article by Michael Newton and others on the fate of glyphosate in an Oregon forest eco-system. It was introduced by Ms. Cronk last week.

THE CHAIRMAN: I'm sure it is here somewhere. Thank you.

MR. CASTRILLI: Q. Mr. Kingsbury, this 1984 study of aerial sprayed forests in Oregon resulted in the detection of glyphosate residues in wildlife tissues at least 55 days after application; is that correct?

MR. KINGSBURY: A. That's correct. There was one reading that I would -- basically we

would place above the minimum, the minimum quantifiable limits of the analytical techniques utilized.

Q. You are referring to page 1148?

A. That's correct.

Q. That is Table 2?

A. Yes.

MR. CASTRILLI: Mr. Chairman, I believe on Exhibit 723 the page numbers may not actually be visible. It would be page 5.

Q. And, Mr. Kingsbury, the text discussion in relation to this can be found at the bottom lefthand column of page 5 under the heading: Wildlife and onto the right-hand part of the page; is that correct?

MR. KINGSBURY: A. That's correct.

Q. Can you also confirm for me that NNG was found in deer mice viscera in this study?

A. What the study says is that -- and correct me if I'm looking at the wrong place in the study, I'm looking at the bottom of page 1149.

Q. You can start there, if you like.

A. Basically it says there that there were two instances when NNG was found near the detection limit; they were in fact found once in a foliage sample, once in a litter sample and the authors

indicate some doubt whether, due to the detection -- very close to the detection limit whether these in fact are necessarily positive findings of NNG.

I can't find reference to NNG in mouse viscera. If you can point it out to me, Mr. Castrilli.

Q. Page 1148?

A. All right.

Q. It would be the series of notes under Table 2?

A. Yes.

Q. Part of the third line:

"NNG not found at detection limit of 0.4 milligrams per kilogram in any samples except deer mice viscera..."

A. "...for which the detection limit..."

Q. "...was 0.5 milligrams per kilogram."

A. Which indicates to me that it was not found in either, but there was a different detection limit for deer mouse viscera than for the other samples. It does not indicate it was found in either.

Q. Well, the plain words on the page say it was found in deer mice viscera; is that correct?

A. That is not the way I read it, Mr. Castrilli. I read it that it is saying NNG was not found but that the detection limit at which it was not

detected was different in deer mouse viscera than it was for other samples.

What they are saying is their methodology was not as sensitive for deer mouse viscera, so that not finding NNG there was done with less sensitivity to the presence of the compound in that substrate and that would relate to the fact that in an analytical technique your detection limit is partly dependent on the amount of substrate you have to work with.

As you can imagine, the viscera from a deer mouse would constitute a fairly small item to try and detect material in. It's, therefore, more difficult to concentrate the compount you are searching for because you have a small quantity of material to extract it from and, therefore, your detection limit may not be as sensitive, your analytical methodology may not be as sensitive as in a substrate that you have a larger quantity of material to search for the compound of interest.

THE CHAIRMAN: Dr. Ritter, how would you read that same sentence?

DR. RITTER: I'm sorry, I would just like to see the paragraph in which that table is referred to.

I would be inclined -- I would have to

say I would have very, very little confidence in a value reported which is at the limit of detection of the method. I would take that to mean that they are imputing that a value not present at the limit of detection may theoretically be present at that limit.

Have I clarified that or confused it?

THE CHAIRMAN: Well, what I think I was interested in was, Mr. Kingsbury reads the sentence grammaticaly to say that none was found in either deer mice or anything else, although there were different detection limits for deer mice.

MR. KINGSBURY: That's correct.

THE CHAIRMAN: And I'm just wondering if you read that the same way, or do you read it that none was found for everything else but some was found in deer mice?

DR. RITTER: I don't read that to say that some was found in deer mice, no. I read that to say that the detection limit was .04 in any of the samples except for deer mice, the viscera of deer mice, in which the detection limit was .05.

THE CHAIRMAN: Implying that none was found in deer mice either?

DR. RITTER: That's correct.

THE CHAIRMAN: So you are interpreting

that the same as Mr. Kingsbury?

DR. RITTER: That's correct.

THE CHAIRMAN: Thank you.

MR. CASTRILLI: Q. Focussing on wildlife residues, Mr. Kingsbury.

MR. KINGSBURY: A. Yes.

Q. And the finding of residues up to 55 days after application in contrast to the citation at pages 21 and 22 of the ESSA report.

A. I don't find that to be in contrast, Mr. Castrilli, in that there is ample evidence from the rest of the paper that glyphosate is still present in many components of the environment 55 days after the spray application.

That says to me that the wildlife may still be basically ingesting glyphosate residues. It is not in any way implying that the glyphosate residues measured 55 days after treatment are residues that have been present in the wildlife since the day of application.

Q. Well, let me put the question to you this way: It is conceivable that the presence of glyphosate in the tissues of field tested mice up to 55 days, or whatever the particular period of time was, may be due to the fact that the animals are receiving

repeated doses each time they feed on the contaminated vegetation?

A. That's correct. Whether or not it's a repeated dosage, of course, is -- they may still be receiving material. The implication that is repeated dosage is an untested theory at this point.

Q. Well, it is your testimony that in fact wildlife such as deer prefer glyphosate-treated browse and hay; is that right?

A. I wouldn't -- there is a study, a laboratory study indicating that deer will in fact utilize and perhaps selectively utilize glyphosate-treated browse.

I certainly wouldn't draw from that that in nature deer or other wildlife would go about and select glyphosate-treated food items.

Q. Page 74 of the ESSA report.

A. Yes, I have it.

Q. The second full sentence on that page in the top paragraph:

"In general, deer did not show an adversion to the glyphosate-treated browse and, in some instances, actually preferred it over untreated browse."

A. Yes. I have no quarrel with the fact

that sentence is there. I would, however, point out that this is not a study of deer browse selection in a natural system, it's looking at deer utilization of browse presented to them within a cage-type study and that, to me, does not indicate that there is an actual preference out in the natural environment for glyphosate-treated browse.

Q. I'm sorry. I am sorry I didn't catch last part of your...

A. That doesn't suggest to me that in a sprayed area deer would actually select for browse with the presence of glyphosate there.

This is certainly saying deer did not appear to avoid it, in some instances they actually selected for it when presented in a manger-type study, if you want to use the words in one of the documents you have provided to me.

Q. You didn't make that -- the qualification you have just made does not in fact appear on page 74; is that right?

A. No. That is my -- having knowledge of the study and how the study was conducted, I'm just trying to point out that this is not a study done in a sprayed environment, it's a study done with caged deer providing food in a very unnatural fashion.

Q. So if I understand your testimony - and correct me if I'm wrong - it's conceivable that wildlife could receive repeated doses of glyphosate each time they feed on contaminated vegetation?

MS. MURPHY: He did not say that. In fact he said specifically that he wasn't talking about repeated doses.

MR. CASTRILLI: Well, with all due respect, we are talking about residues 55 days after application.

Q. Is it not conceivable if the animal is in the same area for more than one day he's going to eat something more than once, assuming he's feeding in that area?

MR. KINGSBURY: A. That's correct. As long as the residue is in that environment in substrates that the wildlife -- the organism in particular comes in contact with or ingests, that it is in fact going to be exposed to, via different pathways, residues of the pesticide in question.

Q. More than once?

A. That's correct.

Q. Thank you.

A. That does not imply that the state -- this in any way contradicts the statement that once

those residues enter the organism they will in fact be rapidly eliminated, the statement that I believe you have asked me to basically comment on.

Q. And the proposition I'm asking you to comment on now is that it's conceivable, on the basis of the Newton study, Exhibit 723, that the continued evidence of glyphosate in the tissues of field-tested wildlife may be due to their receiving repeated doses by repeated eating; is that correct?

A. Or it may be due to them having received a dose prior to being sacrificed and analyzed. That, in itself, doesn't say anything about when previous doses would have occurred.

THE CHAIRMAN: So your testimony is the previous dose could have occurred within five days, hadn't yet dissipated and that is what is showing up. Is that possible, within five days of being tested?

MR. KINGSBURY: That's correct. I'm basically saying that from what we know about the behaviour of glyphosate within wildlife species, this would indicate that there has been recent exposure to the material.

MR. CASTRILLI: Q. And we are still focussing, Mr. Kingsbury, on page 74 which is the Sullivan study, 1985.

MR. KINGSBURY: A. Yes.

Q. Would you agree that that study raises concerns about exposure of mammals to glyphosate, Roundup or Vision in that they did not show an adversion and some may actually have preferred it over untreated browse?

A. No, I would not agree.

Q. Not agree. What about humans, Mr. Kingsbury or Dr. Ritter, who might feed on the wild food that has been contaminated in this or related matters, should we be concerned about their intake of these chemicals through that route?

DR. RITTER: A. I don't think so, Mr. Castrilli. That question actually has been examined in some depth and there are estimates of the anticipated risk that may be associated with consumption of food commodities that may have been contaminated with glyphosate as a result of direct forestry application.

And I would refer you specifically to -- there are several sections I'm referring, Mr. Chairman, to the analysis done by Crump, et al in what is now Exhibit - I need some help, Ms. Murphy, I'm afraid I don't know the exhibit number - entitled: Worst-Case Analysis Study on Forest Plantation Herbicide Use.

MS. MURPHY: Exhibit 716.

DR. RITTER: 716.

MS. MURPHY: The thing is that, Exhibit 716 contains some portions of the Crump report that was put in by Ms. Cronk and I believe it contains the executive summary and certain portions of that report.

DR. RITTER: I'm not sure if I will be quoting now from the excerpts which were provided or from perhaps a component of the document which was not provided, but I'm sure that we can make the entire document available, if necessary.

MR. CASTRILLI: Q. Dr. Ritter, why don't you simply put your comments on the record and if what you are referring to is not part of Exhibit 716, I'm sure Ms. Murphy will provide me with whatever it is you are referring to.

DR. RITTER: A. Okay. If we refer to Section 2.3.4 of that document which is entitled: Exposure by Ingestion of Food, and I refer you specific specifically to Sections 2.3.4.3.1, .2 .3 and .4, those sections deal with anticipated risks associated with exposure to food contaminated with glyphosate either in meat, fish, wild berries or garden vegetables respectively.

And if we take, for example I'm not sure if you referred in your question to wild berries, but I

would refer you in this case specifically to page 78 of that document and to Section 2.3.4.3.3.2.

THE CHAIRMAN: Who figured this out, this numbering system, a scientist of some kind?

MS. CRONK: Mr. Chairman, I am sorry. Mr. Castrilli, if I can assist. I have a copy of the full report I can provide to the Board and you may recall that I indicated that if it was needed I would provide it.

So I will have copies made for those who don't have it and it will be of assistance.

THE CHAIRMAN: Thank you.

MS. CRONK: I would like the record to show, sir, that it was not through me that you heard of this numbering system.

DR. RITTER: The section that I've referred to provides an estimate of the anticipated exposure to glyphosate both for reasonable and a worst-case.

You will recall when we discussed the Crump report that there were estimates which were based both on what he referred to as reasonable and worst-case estimates, both of which are elaborated on in this section that I refer to.

The actual exposure levels, for example,

worst-case total exposure - and I'm reading from the bottom of page 78 - based on assumptions, as stated for 2,4-D, the worst-case total exposure would be expressed as the individual exposure context which is 3.36 times 10 to the -2 milligram per kilogram times 20 servings.

That is, in this analysis Dr. Crump makes the assumption that one will eat 20 servings of berries at one time, all of which have been contaminated all at the maximum level possible with glyphosate, and that would provide a total exposure of 6.72 times 10 to the -1 milligram per kilogram or .6 milligram per kilogram.

I would then have to refer you to Section 5 of that same document entitled: Risk Assessment for Glyphosate.

THE CHAIRMAN: What page is that?

DR. RITTER: Page 138 for the risk assessment of glyphosate. And on page 138 begins the actual risk assessment and risk characterization for glyphosate, and I would refer you specifically to page 141. I'm sorry for the long answer, but you asked, Mr. Castrilli, as to whether or not we are concerned about the potential -- whether one should be concerned about the potential exposure from glyphosate in food commodities.

I'd refer you to the second last paragraph on page 141. It says:

"The estimated risks in Table 5.8 are all very small with the largest worst-case estimate (corresponds to the largest estimated environmental exposure from ingestion of wild berries) being only 8.76 times 10 to the -10 or less than 9 in 10-billion."

So to answer your question now as simply as I can, in my view, there is absolutely no reason to be concerned whatsoever about the possibility of ingestion of berries which have been contaminated with glyphosate.

MR. CASTRILLI: Q. We were talking about contaminated wild food. Are residues of glyphosate stable when frozen, Dr. Ritter?

DR. RITTER: A. I don't know. Generally speaking, when residue -- when maximum residue limits are determined, they are determined under a variety of conditions of processing and cleansing and cooking and so on and so forth.

I can't tell you specifically if the stability of glyphosate under freezing has been determined, but I can tell you that the estimate which

I've just provided for you from page 141 of the Crump document is based on the assumption that 20 servings of berries are consumed at one time.

So that even if glyphosate -- if we make the assumption, for the purposes of discussion, that glyphosate is stable under freezing indefinitely forever, it would not change the fact that one would still have to consume 20 servings of berries contaminated with glyphosate at one time and still experience a risk no greater than 9 in 10-billion.

THE CHAIRMAN: Dr. Ritter, would this, in your opinion, be representative of consumption of any type of food?

DR. RITTER: None that I'm aware of. As Dr. Crump has indicated in his document, he has deliberately exaggerated the potential exposure in his worst-case estimate and his risk analysis is based on that worst-case estimate.

If one were to do the same calculation but assuming a realistic exposure; that is, perhaps one or two servings of berries, one might expect that that estimate would fall by perhaps an order of magnitude. So instead of being 9 in 10-billion it might be 1 in 10-billion excess risk.

THE CHAIRMAN: Okay, but this is in the

forest setting. Now, obviously, glyphosate is also used in agriculture?

DR. RITTER: Yes.

THE CHAIRMAN: And does this type of risk analysis apply also to glyphosate that may be sprayed on vegetables and other types of food that would then be consumed by humans?

DR. RITTER: Yes. When maximum residue limits are determined -- if I can take you back just very quickly. When, during the course of my formal presentation, I discussed how we establish an acceptable daily intake; that is, we take the no effect level from the study divided by an appropriate safety factor and that gives the acceptable daily intake.

When one is setting maximum residue limits for a pesticide, both nationally in Canada and internationally through the World Health Organization, the intent is to allow continuing registrations which require maximum residue limits until that ADI has been entirely saturated; that is, if the ADI is 10 milligram per kilo, for example, and the first application which one receives for a maximum residue limit will result in daily consumption of 1 milligram per kilo, that means there is 9 milligrams left over for expanded registrations of that product.

Now, as soon as one hits 10, if that were the ADI, no further expansion of use requiring maximum residue limits would be permitted. So that MRLs are based on the total anticipated dietary exposure from all sources.

THE CHAIRMAN: World-wide?

DR. RITTER: Well, in Canada for Canadians, but including imported food because imported food is covered by exactly the same provisions of ADI and the maximum residue limits as food produced domestically.

In the case of the wild berries in particular, because the overall exposure to that component is expected to be so very small it's unlikely that it would make any contribution to the ADI in any case. The calculated anticipated exposure borders on non-existent, it's virtually not present.

THE CHAIRMAN: Thank you.

MR. CASTRILLI: Q. Dr. Ritter, last night I asked you what the current acceptable daily intake in Canada for glyphosate was and you said you don't know?

DR. RITTER: A. That's correct.

Q. Do you know what the maximum residue limit for glyphosate is with respect to human

consumption--

A. No.

Q. --for any wild food?

A. No, I don't. Well, it would not be for a wild food. As I have tried to indicate, Mr. Castrilli, the ADI is a toxicologic value; that is, we would have a maximum acceptable daily intake. The individual maximum residue limits would then be tallied.

So that if, for example, from commercially available foods we knew that 50 per cent, let's say, of the acceptable daily intake had been used up, then that would allow an additional 50 per cent to be used up by unknown sources such as wild berries. There are -- I would venture a guess in saying that there are probably virtually no maximum residue limits in which anywhere near the total ADI has been utilized by existing registrations.

If I may, Mr. Chairman, the reason for that, Mr. Castrilli, is because maximum residue limits when they are established are based on a number of assumptions, the sum total of which --

THE CHAIRMAN: Could you slow down a little, please.

DR. RITTER: I'm sorry. Maximum residue

limits when they were established are based on a number of assumptions, most of which are intended to exaggerate the risk factors in terms of public health protection.

For example, when we establish maximum residue limits by convention, one sets them on the assumption that all food that one consumes is always contaminated and always at the maximum residue limit permitted by law.

So all -- you are only consuming food which has been treated, all the food that you are consuming has been treated and it has all been treated at the maximum residue limit and processing, cooking and storage has not resulted in any decline of those residue levels at all.

Now, we know that those four conditions independently are never met and, in fact, that approach has been criticized by the U.S. National Academy of Sciences because they have argued in a document entitled: The Delaney Paradox Regulating Pesticides in Food, authored by the United States National Academy of Sciences, they have argued that that method of calculation has probably prevented the introduction of some very useful pesticides in food production areas, particularly in developing countries, because that

calculation has led to ADIs and maximum residue limit determinations which have been unnecessarily exaggerated to the point where they have imparted the impression of risk where actually none exists.

And the U.S. National Academy of Sciences has recommended that a much more realistic approach be taken to the way in which maximum residue limits are determined.

In other words, they simply said: Don't make the assumption that all the food you eat is always contaminated, always at the maximum residue limit, and that none of that residue is lost through any processing whatsoever.

MR. CASTRILLI: Q. Dr. Ritter, for the purposes of our discussion this morning I just wanted to clarify that you do not know what the MRL is for glyphosate; is that right?

DR. RITTER: A. I can verify that, if you like. It's not a difficult number to obtain. It's part of the public record.

Q. Fine. And for the record, you don't know whether such limits could be exceeded by frozen wild food; is that right?

A. We could -- based on the existing MRLs, I think we could speculate with some accuracy as

to whether or not that could likely happen. You would like to know, Mr. Castrilli, what the current MRLs are for glyphosate?

Q. That's right. And as a health expert, Dr. Ritter, can you just confirm for me that it is conceivable that the freezing of wild food would permit the life of the glyphosate residue to be extended indefinitely?

A. It's conceivable.

Q. So that it's possible that a native person or a sports hunter who brought home contaminated foods such as venison and put it in his freezer might unwittingly expose his family to repeated doses of the chemical every time they had a venison steak?

A. Yes. When you asked a moment indefinitely, I presume you mean that within some reasonable time period. I think it's unlikely that someone will expose their family to venison contaminated with glyphosate five years after they've caught it.

Q. Well, for the life of the size of the venison, put it that way?

A. Yes. I think it's possible that one could extend the half-life of the glyphosate in freezing under such circumstances, yes.

Q. Thank you. Mr. Kingsbury, just go really at pages 73 and 74 of your ESSA Document.

MR. KINGSBURY: A. Yes.

Q. You refer to another study by Sullivan. We were talking earlier about the 1985 Sullivan, we are now talking about Sullivan and Sullivan, 1979. Do you see that at the bottom of page 73, top of 74?

A. Yes, I do.

Q. That study is summarized at those pages of the ESSA Document and indicates that:

"The Sullivan study determined the preference of black-tailed deer for glyphosate-treated and untreated red alder browse."

Is that right? And the study -- sorry, are you with me?

A. Yes, I'm with you.

Q. The study concluded:

"There were no significant differences between the amounts of control and treated alder by the deer during the trials."

Is that right?

A. That's correct.

Q. Would it be fair to say that the conclusions and the findings of this study were meant to indicate that spraying with glyphosate should not prevent deer from feeding on foliage in the affected area; is that what --

A. I believe that's a fair assessment of the conclusion -- the purpose and conclusion.

Q. And would it be fair to say that the study supports the conclusion that using Roundup in forest eco-systems will have negligible ecological consequences?

A. The study in itself simply demonstrates that using Roundup in forest situations will not selectively deter deer from feeding on foliage that's been treated.

It, of course, makes sense that as the Roundup exerts its toxic effect on that plant foliage that, you know, the character of the foliage will be affected in a way that at some point deer are unlikely to choose to browse on it.

Q. Can you confirm for me at the time this -- at the time that Roundup was being considered for registration in Canada for forestry use this study was one of the few studies that the registrant offered in support of that proposition?

A. I would concur that at the time of an early development of the registration package that probably would be -- tend to be true, that this was one of the few studies on how wildlife species -- there was in course at that time a full complement of your acute and long-term toxicity studies done in laboratory situations with mammals and birds, fish, et cetera.

Q. I am speaking of the environmental fate studies. This would have been one of the few?

MS. MURPHY: I'm sorry, is that environmental fate?

MR. CASTRILLI: Yes.

MR. KINGSBURY: Environmental toxicology?

MR. CASTRILLI: Q. No, just fate.

MR. KINGSBURY: A. I believe this study would be part of the environmental toxicology package.

Q. All right. Let's just shorten this up. Are you aware of the concerns that were raised by federal wildlife officials regarding the adequacy of this study at the time the registrant was seeking registration of Roundup for forestry use in Canada?

A. I'm aware of the concern that this type of study perhaps does not fully address what might happen in a natural forest eco-system treated with the material.

Q. Mr. Kingsbury, you have been referred to a letter that was written by a reviewer of this study; is that right, a Pierre Mineau?

A. That's correct.

Q. He's with the Canadian Wildlife Service?

A. Mm-hmm, yes.

Q. A letter addressed to Dr. P.Y. Chang of the Pesticides Division of Agriculture Canada in August of 1982?

A. Yes.

Q. You are familiar with this letter?

A. I have the letter in front of me.

MR. CASTRILLI: Mr. Chairman, I would ask this be made the next exhibit.

THE CHAIRMAN: Exhibit 736.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 736: Letter from Pierre Mineau addressed to Dr. P.Y. Chang of the Pesticides Division of Agriculture Canada, dated August, 1986.

MR. CASTRILLI: Q. The author of this exhibit...

MR. KINGSBURY: A. Sorry, Mr. Castrilli, go ahead.

Q. Sorry. The author of this exhibit -- author of this letter is Mr. Pierre Mineau; is that right?

A. That's correct.

Q. Pesticide Evaluator, Toxic Chemicals Programs, the Wildlife Toxicology Division of Canadian Wildlife Service?

A. Yes. Pierre has been involved in the registration review and commenting to Agriculture Canada on registration packages from, I believe, about 1981.

Q. And can you confirm that Mr. Mineau was an external reviewer of the ESSA report?

A. I believe that's correct. I will just confirm that for myself. That's correct.

Q. I refer you to page 2 of the exhibit.

A. Yes.

Q. Paragraph No. 2, Mr. Mineau indicates that:

"The registrant offers two studies to prove that the ecological consequences of using Roundup in forest eco-systems are negligible."

And then the remainder of the letter goes on to discuss those. I am going to go through this

with you briefly. In paragraph 3--

A. Yes.

Q. ---he refers to the first of the two studies, he's discussing Sullivan and Sullivan, 1979. Just stopping there. That is the Sullivan and Sullivan we find at pages 73 and 74 of your evidence; is that right?

A. That's correct.

Q. Your evidence being the ESSA report. You say -- Mr. Mineau states that:

"The first one (Sullivan and Sullivan study of 1979) was a "cafeteria style" experiment where captive-raised Black-tailed Deer were given a choice of freshly cut alder branches and alder branches treated with glyphosate over and beyond their usual "deer laboratory chow."

A. Yes.

Q. He notes that:

"It was found that the deer did not mind the glyphosate-treated vegetation even though it was brown and shriveled and had been picked up from the forest floor."

And:

"From those observations, the authors of the study concluded that the application of glyphosate in the Fall would not be harmful to deer at the critical time when fat reserves are being built up."

Is that a fair summary of the paragraph?

A. Those are Mr. Mineau's exact words, yes.

Q. Mr. Mineau goes on to say:

"It seems to me..."

That is to say, it seems to Mr. Mineau:

"...that these conclusions are somewhat naive. For one thing, as the authors pointed out, the nutritional value of the dead leaves was not compared with fresh browse."

And, secondly, Mr. Mineau had:

"...some difficulty in seeing deer browsing anyway on forest litter."

It goes on to state:

"Just because dead leaves are taken from a manger by captive animals doesn't mean that the individuals in the wild population will become..."

To use the term --

A. Detritivores.

Q. "...detritivores overnight."

Do you agree with that assessment?

A. I believe that if Mr. Mineau is pointing out that this study simply indicates that deer will not avoid glyphosate-treated foliage, that they will continue to utilize it, that's a more appropriate use of the study.

I could not confirm for you that Mr. Mineau is in fact referring absolutely correctly to conclusions made in that study without having that study in front of me. I'm not sure whether the authors of that study would have made the conclusions that he claims are made there in exactly the fashion he seems to feel they have made them.

Q. You are not in a position to confirm or deny your understanding of that study itself?

A. I would like to see the study in front of me before I did that.

Q. Well, didn't you consider the study when you helped in the production of the ESSA report?

A. You will note, Mr. Castrilli, that I was a reviewer of the ESSA Document, I was not involved with the panel of experts that actually were involved

in putting together the sections which the ESSA people then put together as a final report.

Q. So that you read a version of the ESSA report which presumably had the pages that we have referred to as pages 73 and 74 with the references; I presume you did that much?

A. Yes.

Q. You did not read the references themselves?

A. I have read the Sullivan and Sullivan study and - not recently - the 1979 Sullivan and Sullivan study, I have read myself. Mr. Mineau is inferring certaint conclusions were made in that study and I would like to confirm that those studies were in fact made before I commented on them.

However, I feel that the ESSA Document very appropriately does not try and utilize this study to prove negligible ecological consequences or to say anything about nutritional value of glyphosate-treated foliage to deer; it in fact uses the study to make the point that there were no significant differences between the utilization of treated and untreated alder foliage by deer I believe that's a very appropriate conclusion and statement to use this study to support.

Q. Well, just from the part of the

paragraph I read you which begins with the phrase.

"It seems to me..."

Down to the phrase that indicates:

"....to detritivores overnight."

A. Yes.

Q. You cannot tell us now whether you agree with that assessment; is that right?

A. I believe that that's a very personal assessment by Mr. Mineau and --

Q. Well, was Mr. Mineau commenting in his personal capacity or was he commenting in his capacity as Pesticide Officer for Canadian Wildlife Service?

A. He's commenting in his capacity as Pesticide Officer for Canadian Wildlife Service.

Q. Let's go on in the paragraph. Mr. Mineau states:

"The only thing that was proven conclusively in that study..."

That's the Sullivan and Sullivan study:

"...is that glyphosate-treated vegetation is more or less palatable as deer laboratory chow."

And then he goes on to state:

"A meaningful study would have been to

look at the availability and quality of standing browse after real life applications of these herbicides."

Do you agree with that assessment?

A. I would agree with that assessment and I would also point out that this Board has already seen -- had presented to it some data that was present in the paper Ms. Cronk submitted as evidence by Newton, et al, that talked about the availability and quality of standing browse after a real life application of glyphosate and other herbicides.

Q. That was a study dated 1989?

A. That's correct.

Q. Five years after it was registered in Canada?

A. That's correct.

Q. Thank you. Just continuing with the Pierre Mineau letter, Exhibit 736 --

THE CHAIRMAN: Are you suggesting, Mr. Castrilli, there is anything wrong with a product being registered at a particular point in time on a particular database that happened to exist at that point in time, and then at some later date when additional studies come about for a variety of reasons that may in fact confirm the earlier registration or

not indicate a problem with the earlier registration, that there is something wrong with that?

MR. CASTRILLI: Yes, I am, Mr. Chairman, in the sense that that we either have pre-market registration in Canada or we don't, and I think the rest of this letter will go on to indicate the other concerns that Mr. Mineau had with what was available to Canada at the time this product was registered.

MR. KINGSBURY: If I might just point out, as I did in my direct evidence, one of the realities with forestry pesticides in terms of environmental toxicology is that a great deal of data is generated once the materials are put into use. One of the reasons that happens is much of this general data on environmental toxicology cannot in fact exist until you have a certain extent of use pattern and that, in fact, when you get into something like questions of large ungulates like moose or deer common sense tells you you have to be into a fairly extensive use pattern before there is even opportunity to generate data relevant to them.

MR. CASTRILLI: Q. Let's continue with the Mineau letter, Mr. Kingsbury.

MR. KINGSBURY: A. Yes.

Q. In the last paragraph on the page

Mineau goes on to discuss the small mammal population dynamic study.

A. Yes.

Q. Which is the mouse study and the citation is also in the Sullivan, 1981 and he concludes that:

"It is not very representative of the actual use patterns."

Do you agree with that assessment?

A. I believe Mr. Mineau says that the study was not representative of actual use patterns because the time of spray resulted in a leaffall only three to four weeks earlier than usual, and he also makes a statement saying that there was shade offered by the plantation trees which would indicate that this study was done in a situation where there was perhaps a fairly advanced overstorey of conifers.

That is one potential situation in which glyphosate would be used. It wouldn't cover all situations in which its use is contemplated.

Q. So you agree with Mr. Mineau's assessment?

A. I'm basically saying it does not cover each and every use pattern and situation, it certainly is representative of one.

Q. One of many?

A. One of a variety, yes.

Q. Page 3, the second full paragraph on the page -- excuse me, the first full paragraph on the page beginning with the word: "unfortunately".

A. Yes.

Q. Mr. Mineau says:

"Unfortunately, these two studies represent the sum total of the terrestrial ecology work in support of registration for forestry use, not a reassuring situation."

Do you agree with that assessment, Mr. Kingsbury, as it existed in 1982?

A. No, I would not agree with it in total. I know, for instance, as a fact that the study by Newton that we have discussed at some length, Exhibit 723 which deals with glyphosate, its fate and residues in an Oregon forest eco-system and includes discussion of residues in wildlife species was part of the registration package that Mr. Mineau had before him at this time.

Q. He doesn't refer to it in his letter?

A. I realize that, but I know for a fact that it was part of that data package. Perhaps it

wasn't part of what Mr. Mineau actually saw. I can't of course testify to that.

It was part of the registration package that I saw at this time and I would assume that he saw the same package.

Q. Well, did he write a subsequent letter, or do you know?

A. This is -- this letter would be one.

MS. MURPHY: If I might interject. This letter was provided to the witnesses by counsel last week and whether there was anything subsequent or not, it would seem to me, it would have to be produced by Mr. Castrilli because these witnesses certainly didn't have an opportunity to search --

THE CHAIRMAN: No, but he can be asked whether he knows if any subsequent letter. If he doesn't know, let him just state that.

MR. KINGSBURY: This type of letter would be part of an ongoing correspondence between Agriculture Canada and its advisory agencies. I cannot answer the question whether there was in fact a subsequent letter, although certainly I know that there was a continuing correspondence dealing with, as this letter does, both the specific registration of glyphosate and more general concerns of Mr. Mineau

regarding herbicide use in forestry in general which -- and which I might suggest this letter is in fact, to a large extent, attempting to address.

MR. CASTRILLI: Q. I'm sorry, this letter is attempting to address...?

MR. KINGSBURY: A. A more general concern regarding herbicide use in forestry and its effects on wildlife.

Q. It seems to be talking about Roundup; isn't that what it says?

A. That's correct, but I believe Mr. Mineau goes on to address a number of issues that are much more generic in nature.

Q. Well, let's move through the remainder of the letter and see what he in fact does say. The next paragraph which begins with the phrase: "we fully realize".

A. Yes.

Q. Generally in this paragraph Mr. Mineau is referring to what he calls the economic and political pressures to allow wide-scale use of herbicides such as Roundup in forestry and goes on to note that:

"This climate of haste is not the best for an impartial clear-headed view in

assessment of the situation."

Mr. Kingsbury, do you agree that a climate of haste surrounded the registration of Roundup?

A. No, I would not agree, but I would go on to comment that there are certainly within some sectors - and I believe this is true of Mr. Mineau's position - there was a perception that because all of a sudden there was, from some peoples' perspective there was things like the CCREM Task Force, there was a growing profile of forestry and discussion of forestry issues, some people felt that all of a sudden the use of herbicides in forest management in Canada was going to increase by a phenomenal factor and that some of the comments here reflect Mr. Mineau's perception that there was going to be a sudden massive increase in herbicide use in forestry in Canada.

Q. Let's continue with the paragraph. He notes that:

"CWS lacks any concrete data on which to oppose registration."

I'm wondering, Mr. Kingsbury, as someone who has had considerable involvement with the registration of herbicides for forestry use in terms of reviewing forestry registration submissions, can you

confirm for me that it is the registrant who is obligated to provide adequate data in support of registration?

A. That is correct.

Q. Not the regulatory agencies?

A. That's correct.

Q. Dr. Ritter, you have had some similar experience with the federal registration process. Would you agree that it is the registrant who must provide adequate data on his product and not government agencies?

DR. RITTER: A. Absolutely.

Q. Now, Mr. Mineau continues in his letter to note that:

"Certain steps should be taken to Minimize impacts on wildlife from this herbicide."

Mr. Kingsbury, and speaking there of Roundup again. First, that the application -- or excuse me:

"The rates of application for Roundup in conifer release should be specified to be less than that for site preparation."

Do you agree with that recommendation? We are in the last paragraph on page 3 now.

MR. KINGSBURY: A. I would suggest that Mr. Mineau is making that recommendation on the basis of something stated in the Newton paper we referred to earlier, Exhibit 723, wherein the United States there is in fact a differential application rates for those purposes.

In Canada we have not found it that such a difference is required and, in fact, the difference in rates in the States reflects the fact that there is a higher maximum rate available for use in some situations. In Canada we have limited the use to something less than the maximum that is registered in the States.

Q. I just ask you generally, if you know: Is the quantity of herbicide needed for conifer release lower than that needed for site preparation, if you know?

A. In most -- depending on the site and the species present on the site, really it has a lot more to do with the tolerance or sensitivity of the species to be controlled than it does for the generic use, whether it's for conifer release or site prep.

Q. Well, Mr. Mineau continues in that paragraph to note that -- or he refers to a range of 3 to 6 litres per hectare as being the rates of

application specified for Roundup for both conifer release and site preparation. Is that still true today?

A. I believe that's true, yes.

Q. So from the perspective of this letter, nothing has changed since 1982 in that regard; is that correct?

A. That in fact the registrant has not applied for any changes in rates of application, that's correct.

And unlike the situation in the United States, I would point out that in Canada it is required that the registrant submit data proving or verifying the efficacy of the product at the rates that are being -- for which registration is being requested.

So that in Canada, unlike in the United States, there would in fact be a data package to support the fact that these rates are in fact appropriate for the use for which registration is being sought.

Q. Now, we are now at the top of page 4 of Exhibit 736.

THE CHAIRMAN: Do you want to finish off this document, Mr. Castrilli, and then take a break?

MR. CASTRILLI: Yes, that will be fine,

Mr. Chairman.

THE CHAIRMAN: Okay.

MR. CASTRILLI: Q. Mr. Mineau suggests that:

"A further major step is necessary and that is the acquisition of better use data."

Do you agree, Mr. Kingsbury?

MR. KINGSBURY: A. I believe that you will find that the acquisition of such data has in fact been largely addressed in the interval from -- since 1982 when this letter was written and that, in fact, Dr. Campbell was able to give rather extensive -- present rather extensive data to this Board on the use of herbicides for forestry in Ontario and I'm aware of such data in other jurisdictions.

Q. Well, let's just continue with the context of the letter first and then we will deal with what Dr. Campbell provided this Board. Mr. Mineau states that:

"The Canadian Wildlife Service has been told repeatedly that the areas to be treated are relatively small and dispersed, thereby minimizing impacts on wildlife."

He goes on to state:

"Unfortunately we have no database on which to assess these claims."

Now, stopping there, Mr. Kingsbury, does this Board have any glyphosate use data for any management unit within the area of the undertaking?

MS. MURPHY: Mr. Kingsbury has no way of knowing that.

THE CHAIRMAN: If you can't answer that question just say so.

MR. KINGSBURY: I'm not aware. I know that there -- I'm aware of generic evidence that Dr. Campbell presented regarding the number of units within an area that might receive it and the average size of treatment blocks within an area.

MR. CASTRILLI: Q. I will put the question to you this way: Did you provide any such evidence?

MR. KINGSBURY: A. No, I did not. I might comment as well that there is no requirement within the registration process to provide the Canadian Wildlife Service with such data as what the size and dispersal of areas where this pesticide would be applied.

That in fact is something that is done

after the product is registered through the restriction -- the imposition of a restricted category which then requires provincial permitting with the person who intends to use the product submitting to the provincial authorities data on the actual site to be treated.

So I would suggest that it is something that falls outside of the requirements of the federal registration process to provide specific use data that actually outlines the location and size of sites where the material is to be applied.

Q. Let's continue with what Mr. Mineau had to say about this issue. We are still on page 4, the first paragraph.

A. Yes.

Q. He is referring there to the recordkeeping practises in the forest industry generally and government agencies, and it's there focussing on British Columbia with respect to the forest areas treated with pesticide, and he notes that:

> "This type of information is the only way in which long-term effects of herbicide use can be assessed, and that this sort of recordkeeping is an integral part of good forest management."

Do you agree with Mr. Mineau's assessment on that?

A. I would not agree that it's the only way in which impacts can be assessed.

Q. What other ways are there?

A. I believe that the potential for long-term impacts can be assessed on the basis of databases which, (1) indicate that the nature of the changes in the habitat by its action on plant communities and an understanding of the habitat requirements on the wildlife species that's being considered.

Q. Does this Board have any such information for a single management unit in this province?

A. I'm not sure that we're not mixing apples and oranges here. You are talking about Mr. Mineau's potential -- his ability to evaluate long-term impacts of Roundup on wildlife; is that correct?

Q. That's what the paragraph talks about.

A. Okay. I've indicated that that can be done without Mr. Mineau having the kind of information he's claiming he needs here.

Q. And the manner in which that can be

done?

A. As I indicated, by having a data that specifies the types of habitat changes that would occur by the impacts of Roundup on vegetation and then taking into consideration the habitat requirements of the wildlife species in question.

Mr. Castrilli, if I might suggest, there's -- the only way to determine the impact of a specific pesticide use is to go out and measure that specific use. I mean, I won't argue that, but that does not mean that an evaluation of hazard cannot be made with more general information.

Q. Would you agree with me that Mr. Mineau indicated quite clearly the type of information he believed was necessary in that letter, and your position is, you simply disagree that his objectives can be obtained in that manner and could, in fact, be obtained by some method that you've just described; is that right?

A. I believe that's correct. And, as I've also pointed out, I believe that the federal registration possess says in fact that there is no requirement for a registrant to submit the type of data that Mr. Mineau is saying he would require.

And I would disagree with the fact that

he requires such information to carry out his evaluation.

Q. In any event, you did not include that in your evidence; is that right?

A. Did not include what in my evidence?

Q. The type of information that Mr. Mineau indicated he thought was important. None of that appears in your evidence; is that right?

A. My evidence being the ESSA Document?

Q. That's right.

A. That's correct.

Q. Do you know whether the information that Mr. Mineau was requesting is published by the MNR for individual management units?

A. It's certainly available from MNR, and I would assume that it's on the public record and could be provided to a member of the public who requests it.

Q. Would you agree that it would be reasonable for this Board to have the benefit of seeing this type of information in relation to a particular management unit?

MS. MURPHY: Can we, just before we go any farther, clarify what type of information we are talking about?

If you are talking about pesticide use in Ontario, there is significant evidence that has been put before this Board in this panel, and if that's what we are talking about, then it has definitely been addressed.

MR. CASTRILLI: Mr. Chairman, the question is as plain as I can make it, and in fact Mr. Mineau has made it for me at the top of page 4. That is the type of information I am talking about. So I don't understand Ms. Murphy's objection, if that's what it was.

I'm simply asking the witness: Would it be reasonable for this Board to have the benefit of seeing that type of information.

MS. MURPHY: And the type of information that is being discussed is whether there is some way to tell whether areas being treated are relatively small and dispersed?

That is what I understand Mr. Mineau to be saying, he wants something that shows that areas treated are relatively small and dispersed.

And I would submit, Mr. Chairman, that information -- that evidence, has been put before this Board.

MR. CASTRILLI: It's not the only thing

the paragraph says. It talks about the recordkeeping practises generally with respect to particular areas. I am asking this witness: Is recordkeeping with respect to particular areas important.

THE CHAIRMAN: Well, what kind of recordkeeping? Obviously, if there is going to be spraying in certain areas there has to be licences issued; does there not, by the province for the spraying of a particular area?

Would not those records of those licences be some of the type of information that you are suggesting?

MR. CASTRILLI: That's one example. And I'm simply asking the witness: Is that important information for this Board to see.

MS. MURPHY: That's for the Board to determine and that's a matter of argument.

MR. CASTRILLI: With all due respect, it is not for the Board to determine. I'm asking this witness his expert opinion as to whether he believes it's important or not.

I don't need to have Ms. Murphy's submission that it isn't important for this Board to consider. It is an area within this witness' expertise. We don't make judgments in the abstract.

MS. MURPHY: And you don't ask questions in the abstract either. That's my point, Mr. Chairman.

THE CHAIRMAN: Whether or not it is important for the Board to see it, Mr. Castrilli, would really ultimately be up to the Board.

Whether or not this witness feels that that information might be useful to the Board, may be another question.

MR. KINGSBURY: Mr. Castrilli, if I may endeavour to help. And I believe, you know, if we can perhaps move to something specific and if the question you're asking me is that, if I were to, in my professional judgment, make an assessment of the potential impact from using a herbicide in a specific site, specific location in this province, whether I would want to have that specific information before me, I would say certainly it's relevant, first of all.

If we were talking about an area where there is no moose population, then the impact on moose is obviously something that is rather easily assessed.

From my understanding and my involvement in the process by which -- which has been described in some detail by Messrs. Nicholson and Iskra by which the Ministry goes about proposing and presenting information on spray programs and assessing within the

district the areas of concern or items of concern regarding that pesticide usage, I believe that there is in fact a site-specific evaluation of the proposed use of pesticides, that it would involve both forestry and wildlife personnel at the district level within MNR, that it would involve Ministry of the Environment receiving such site-specific information and then having the opportunity to impose conditions such as buffer zone restrictions or removal of areas from it in the permitting process, and that the public also has the opportunity to look at proposals for such pesticide use accompanied with specific details of the sites and that there is public notice of the availability of plans for proposed pesticide use and opportunities for public input into that process.

MR. CASTRILLI: Just to shorten this up, Mr. Chairman.

Q. Do you agree or disagree, Mr. Kingsbury, that information of this type is useful for assessing long-term impacts of herbicide use -- excuse me, glyphosate use, as Mr. Mineau suggests?

MR. KINGSBURY: A. Certainly at a site-specific and project-specific level, yes.

In terms of Mr. Mineau's ability to make an assessment relative to the registration of this

material that falls within his mandate and the federal registration process and the role it carries out in the use of pesticides in this country; no, I do not believe that is required, that that information be specifically made available to him, and I would suggest it is impossible. Until he fulfills his mandate, such site-specific information is meaningless.

MR. CASTRILLI: Mr. Chairman, this would be an appropriate place to break.

THE CHAIRMAN: Okay. 20 minutes. Thank you.

MS. CRONK: Sorry, Mr. Chairman, as you are rising, if I could retrieve from you the full copy of the Crump Report I will have a copy of that document made.

THE CHAIRMAN: I already put an exhibit number and my initials on it, but subject to that...

MS. CRONK: What is the number, sir?

THE CHAIRMAN: 716.

MS. CRONK: To replace the excerpts?

THE CHAIRMAN: Here, you can have that back. I put the same number as the excerpts which were originally filed as 716. I just did it for my own reference because I thought you were leaving this one with me.

MS. CRONK: Fine. I will have the copies made and we will just substitute that with the earlier exhibit. Thank you.

THE CHAIRMAN: Okay, thank you.

---Recess taken at 10:47 a.m.

---On resuming at 11:25 a.m.

THE CHAIRMAN: Thank you. Be seated, please.

Mr. Castrilli, in order that we can advise some of the other parties as to when they might be expected to be ready for cross-examination, can you tell us whereabouts you are in your examination?

MR. CASTRILLI: Mr. Chairman, I would think I am about a third of the way through.

THE CHAIRMAN: One third. So you don't anticipate, I take it, finishing until when tomorrow?

MR. CASTRILLI: I would think certainly by the end of tomorrow, if not sooner.

THE CHAIRMAN: Okay. Well, we have been advised that the Federation of Ontario Anglers & Hunters expects to be a day and that NAN expects to be between two and three hours, Ministry of the Environment I think is between two and three hours; is that correct, Ms. Seaborn?

MS. SEABORN: At this point, Mr.

Chairman, yes.

THE CHAIRMAN: And then we --

MS. MURPHY: There is also Treaty 3.

THE CHAIRMAN: Treaty 3. We are not sure exactly how long they estimated, but then there is re-examination as well.

It looks very doubtful that we are going to finish this week, and today we cannot sit beyond 5:30, quarter to six at the latest, the hotel needs part of the sound system at 6:00.

But, in any event, that will make it a fairly lengthy day in any event. So we shall soldier on.

MR. CASTRILLI: Thank you.

MS. SEABORN: Mr. Chairman - sorry, Mr. Castrilli - the Board had indicated earlier in the week some possibility of sitting on Friday morning for a couple of hours. Will we be coming back to that issue later?

THE CHAIRMAN: We may. The idea of sitting Friday morning for a couple of hours was to try and finish off. It doesn't appear that there is a lot of point to that given the estimations, if they are correct, because we won't finish in any event, nor even probably be close.

We would anticipate though sitting all of Thursday until five or six o'clock in the evening and go out on a later flight that night if we skip Friday, but we will deal with that shortly.

MS. SEABORN: Thank you.

MS. MURPHY: It would probably be wise right now, Dr. Ritter has just advised me that he does have some conflicts and I don't know exactly what they are, perhaps we better --

THE CHAIRMAN: Okay. Well, perhaps we better hear about that.

DR. RITTER: I understand, Mr. Chairman, yesterday while I was in the air somewhere between Winnipeg and Thunder Bay there was some discussion about resuming on the 28th of August.

THE CHAIRMAN: That was the next time that the Board would be available to sit.

DR. RITTER: I would be unable to appear at that time. I would be unable to appear again until the early part of September. I would have to check with my office as to the exact date, but that would be the order of the date.

THE CHAIRMAN: Then we have a problem with Mr. Kingsbury for when?

MR. KINGSBURY: Basically I'm back to

full-time school on the 11th of September.

DR. RITTER: I will certainly do my absolute best to make it before the 11th of September to accommodate Mr. Kingsbury's schedule, if that's suitable for the Board.

THE CHAIRMAN: Ms. Murphy, will the next panel be ready to go on the 28th?

MS. MURPHY: On the 28th, yes.

MS. BLASTORAH: The beginning of the cross-examination of panel --

THE CHAIRMAN: Except the scoping would then become a problem.

MS. BLASTORAH: We could do the scoping, Mr. Chairman, which is for Panel 15 and commence the cross-examination for Panel 14 which I believe the projections were for at least two weeks.

THE CHAIRMAN: I'm sorry, we forgot about the cross-examination for 14, that has to still come in and that will probably take a good week or two.

MS. BLASTORAH: I believe the projections were for about two weeks to ten days.

THE CHAIRMAN: Okay. All right. So we continue on, in any event, with the scoping on the 28th for 15, starting in with the cross-examination of 14 on that date, continue on until we can get this panel

back, and then we would break that cross-examination, if necessary, to accommodate the rest of this panel.

DR. RITTER: Mr. Chairman, I will endeavour to provide you after the lunch break with some windows in the early part of September.

THE CHAIRMAN: Okay.

Very well, Mr. Castrilli.

MR. CASTRILLI: Q. Mr. Kingsbury, could I ask you to turn to Exhibit 729, that is the Glyphosate Reregistration Document.

MR. KINGSBURY: A. Yes, I have it.

Q. I quickly refer you to pages 77 and 78.

A. Yes.

Q. This is the summary tables on the generic data requirements for glyphosate and the headings are: Degradation Studies, Metabolism Studies, Mobility Studies, and over on page 78: Dissipation Studies and Accumulation Studies.

A. Yes.

Q. Can you confirm for me that as of the date of this document, which is June, 1986, that studies in the United States in these areas were still completely or partially missing for up to 95 per cent of the environmental fate type studies required. That

is basically 18 -- at least 18 of the 20?

A. 90 per cent of them, yes.

Q. And these environmental fate studies included -- or I should say, the types of environmental fate studies that were missing included movement, persistence, accumulation of glyphosate in water, soil, air and fish, crops, aquatic systems and forests?

A. That's correct.

Q. Now, is it your testimony that Canada has all of these studies, to your knowledge?

A. I would testify that in Canada recently studies have been submitted in a number of these areas. I could not specifically indicate which studies are present within the Canadian system at the moment. Probably the last time I saw that database was some two years ago.

Q. Okay, sorry. Let me take you back to the time of writing of what is now Exhibit 729. Would Canada have lacked the same studies in 1986?

A. They would have lacked some of them, I'm not sure that refers to all of them. There would have been some which would, at that point of time, have been -- had protocols submitted or be in progress.

Q. And what -- sorry. Can you confirm, just sticking with this document for the moment being

Exhibit 729, that at least according to the EPA's time schedule, at least four of these studies were not due to be submitted until 1990?

A. Not pertinent to forestry use. Some of the studies required for 1990 such as rotational crops in field are, of course, for agricultural registrations.

Q. Perhaps I could just ask you Dr. -- Mr. Kingsbury, if you are able, to advise the Board of what studies, to your knowledge, from this list either have been submitted to Canada since 1986, study types, and which remain outstanding, if you are able to do that?

A. Again, I'm not perfectly familiar with some of the use pattern codes that are presented in this document.

As a for instance, if you look under -- on page 78 under Dissipation Studies, field for forestry, it has under use pattern G and if you could assist me, Mr. Castrilli, by identifying that use pattern, I would like to make the comment that the study by Newton, et al which we have discussed at length, Exhibit 723, was in fact present in the registration package at that time.

Now, this study would not, of course,

conform to the requirements for a study done in Canada under Canadian forestry conditions, but...

Q. It also didn't conform to the requirements of the United States because they obviously had the Newton study in 1986.

A. And I'm not sure whether that is because under use pattern G refers to ground application or whether it refers to some other use pattern for the study.

Q. Okay. Well, I will look at my complete version of the glyphosate reregistration document and see if they in fact tell us what the various symbols for use patterns are.

And perhaps we can just simply leave it, Mr. Kingsbury, that you will, in your stead, attempt to identify for the Board, to the extent you are able, the study types that may not be available in Canada at this point in time?

A. At the current point in time?

Q. Yes, the current -- August, 1989.

A. Okay.

Q. If you are able. You don't have to identify by name if you can't identify them by name, just advise us of the study types that may not be available. If you can identify them by name, that

would be helpful.

MR. CASTRILLI: Mr. Chairman, perhaps...

MS. MURPHY: Well, how can he identify by name things that don't exist? I'm a little confused about what the actual question is, so that Mr. Kingsbury knows exactly what he is supposed to respond to.

MR. CASTRILLI: Either advise us of the names of the studies that have been submitted in fulfillment of the requirements with respect to environmental fate and, if you can't identify the names, just identify the study types and, obviously, for the ones that have not been done you will simply identify a gap with respect to the study type.

MR. CASSIDY: Perhaps he should also indicate that they are only the study types that are pertinent to forestry, because the witness pointed out there are differences between the two.

MR. CASTRILLI: Well, I don't want to limit it to forestry where, for example, some of the study types in fact relate to fish, non-target organisms --

THE CHAIRMAN: Well, Mr. Kingsbury, is it just a matter of going back, taking a look at the registration package that was submitted or packages

since 1986 and making a list of the types and/or by name, if they are available, of the studies that were submitted as part of the packages? Is that how you go about finding this information out?

MR. KINGSBURY: Yes. Of course, I would have to go directly to Ag Canada who are the holders of the data package and basically ask them whether there is data in each of these areas that Mr. Castrilli has identified, with the exception I would suggest certainly of accumulation studies relevant to crops which are obviously not -- in any degree not relevant.

MR. CASTRILLI: I'm content with that exclusion.

THE CHAIRMAN: And that would not be proprietary in any way; would it, generically describing the studies?

MR. KINGSBURY: No, I would see no problem with Ag Canada basically going along with providing that type of information to me.

MR. CASTRILLI: I'm content with that, Mr. Chairman.

THE CHAIRMAN: Very well.

MR. CASTRILLI: Q. Mr. Kingsbury, I understand your testimony to be that simazine is resistent to leaching; is that correct?

MR. KINGSBURY: A. Again, if you are referring to my testimony, including everything said in the ESSA Document--

Q. Page 27.

A. --you will find information in there that talks about the potential for simazine to leach and it indicates that in fact--

Q. Page 27.

A. That's correct.

Q. The third full sentence, in the second paragraph. To boil it down, it simply says:

"Simazine is resistent to leaching."

And it gives a 1983 cite.

A. That's correct.

Q. Now, Mr. Kingsbury, perhaps you can assist me. The 1983 study is -- a compilation is done by the Weed Science Society of America. Is that what the acronym WSSA stands to?

A. That's correct, refers to the herbicide handbook which is put out by that body.

Q. Thank you. Are you aware, Mr. Kingsbury, that because of its demonstrated capacity or ability to reach groundwater, that the U.S. EPA in 1984 listed simazine as a highest priority; that is to say, priority 1 leacher on its priorty list of leaching

pesticides for the national groundwater study it was conducting?

A. I'm aware of a document you have provided me with that talks about the classification of simazine in terms of potential to leach. Yes, I am.

Q. And, Mr. Kingsbury, that document is a August 28, 1984 memorandum.

MS. MURPHY: Well, excuse me. In this particular situation, I think the -- question was: That this was classified by -- if you can go back.

MR. CASTRILLI: Identified by the U.S. EPA as a priority 1 leacher.

MS. MURPHY: All right. Well, Mr. Chairman, perhaps I just may have a couple of words to say about this particular document. And, again, it might be one that my friends might want to look at.

I do have a concern about this particular document that I understand my friend wishes to put to the witness.

MR. CASTRILLI: Do you have a concern as to its admissibility or its weight?

THE CHAIRMAN: Well, let's here what the concern is, Mr. Castrilli, and then we will ascertain whether it's valid or not.

MR. CASTRILLI: That's fine.

MS. MURPHY: Yes. I would just point out, Mr. Chairman, that the document which was provided last week, and I had a look at it, is a letter. The letter is apparently between one person in the EPA and another person in the EPA. It does not, in my view, purport to be a position of the EPA in the first place.

The document, being a letter, refers to previous discussions, it refers to an intention to have future discussions, and it also refers to a document which apparently was attached that explains the methodology used in coming to this list, none of which is available to the witnesses.

So I just want to bring that to your attention because I'm concerned that the document, first of all, is being characterized as a position of the EPA which I do not believe it is and; secondly, that the witnesses have not been provided with the correspondence previous or correspondence of whatever happened after, or the methodology being used and, in particular, what actually did come with this correspondence.

MR. CASTRILLI: Mr. Chairman, all those submissions are with respect to the issue of weight; they are not with respect to the issue of admissibility.

It is clear from the document on its face as read that the 45 pesticides that are on the attached memorandum are in fact being studied by the U.S. EPA and were being studied by the U.S. EPA in 1984 and the attachment indicates that the 45 being studied are high priority -- highest priority leachers.

It is directly relevant to the testimony given by Mr. Kingsbury and the issue of weight is something we can all argue about when this hearing mercifully comes to an end some time next year.

But as to its admissibility at this point in time, there can be no question.

MS. MURPHY: My point is that the document was described as being a position of the EPA about something, and I suggest that that is not what it is. And as long as it's being looked at with the understanding of what it actually is is a memo between one person and another person in the EPA at some point in time, that's another matter.

THE CHAIRMAN: Okay. Well, you have stated your objections, Ms. Murphy, as to what your belief the document stands for. Mr. Castrilli has, or may through his questions, indicate a contrary belief. The Board will take both into account in terms of weight.

As far as its admissibility goes, it's properly before the Board.

MR. CASTRILLI: Thank you, Mr. Chairman. I would ask that it be given the next exhibit number.

THE CHAIRMAN: Exhibit 737.

MR. CASTRILLI: Q. Mr. Kingsbury you have a copy of this, no doubt?

MR. KINGSBURY: A. Yes, I do.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 737: Memorandum from Stewart Cohen Groundwater Team Leader, Exposure Assessment Branch, Office of Pesticide Programs, U.S. EPA.

MR. CASTRILLI: Q. Now, Mr. Kingsbury, the document which is now Exhibit 737 is a memorandum from the Groundwater team leader, Exposure Assessment Branch, The Office of Pesticide Programs for the U.S. EPA; is that correct, Stewart Cohen?

MR. KINGSBURY: A. That's right, it's a memorandum from him to another individual.

Q. Right. The Work Group Chairman for the Office of Drinking Water for U.S. EPA, Dr. Irv Pomerantz; is that right?

A. That's correct.

Q. And if we look at page 2, of the

exhibit--

A. Yes.

Q. --we note in the third paragraph that the tables which are being referred to which are attached note that some 70 per cent of the herbicide -- 70 per cent of the pesticides on the list are herbicides; is that right?

A. That's correct.

Q. And the tables themselves are divided into two parts and, for the purposes of our discussion, we are looking at the priority 1 chemicals?

A. Yes.

Q. I ask you to turn to what would be or is page 3 of Table 1.

A. Yes.

Q. Would you agree with me that the sixth herbicide listed on the page in the left-hand margin is simazine?

A. The sixth pesticide, yes.

Q. And generally this is a list of a total of 45; is that right?

A. I will take your word for it, Mr. Castrilli.

Q. Well, on page 1, Mr. Kingsbury, the first paragraph it simply says:

"These chemicals may have a potential to contaminate groundwater via normal agricultural use."

MS. MURPHY: I am sorry, where does it say that?

MR. CASTRILLI: Page 1.

MS. MURPHY: Is this on page 1 which it explains what priority 1 means, the chemical to be the top priority for monitoring?

MR. CASTRILLI: Yes, that's right.

Q. And in paragraph 2, priority 1 means that these chemicals are considered by the author of the memorandum to be the top priority for monitoring and priority 2 means with respect to the priority 2 chemicals which we are not concerned with here.

MR. KINGSBURY: A. Yes. I would note here, Mr. Castrilli, the way I read this, from the first sentence:

"The list of chemicals I recommend for our joint monitoring survey is attached."

That the author of this letter is setting priorities for a monitoring survey and, to me, that is indicating that he's saying that, in his opinion, these are the things that are important to include in a monitoring survey that he's proposing with this other

individual.

The criteria for selecting these chemicals, he says in the first sentence of the third paragraph:

"Processing criteria used to select these chemicals were explained in my August 13th, 1984 memo which is attached."

I would note that I do not have a copy of that memo and, therefore, can only understand priority 1 in the most general of contexts, that it's a priority for a monitoring study that he's discussing with another individual.

Q. That's fine. I don't have the August 13th memo myself, but what I do have, however, is a 1989 Agricultural Canada report on the same topic. And I understand you have the same document as well, or an excerpt from it; is that right?

A. The backgrounder?

Q. Yes, that's right.

A. Yes, I do.

Q. That backgrounder is entitled: The Characterization and Identification of Potentially Leachable Pesticides in Areas Vulnerable to Groundwater Contamination by Pesticides in Canada?

A. That's correct.

Q. It's produced by Agriculture Canada?

A. That's correct.

Q. And what I have provided to you is an excerpt; is that correct?

A. Yes.

Q. And it's a 1989 document I believe?

A. Yes.

MR. CASTRILLI: Mr. Chairman, I ask that this be made the next exhibit.

THE CHAIRMAN: Exhibit 738.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 738: 1989 Agriculture Canada document entitled: The Characterization and Identification of Potentially Leachable Pesticides in Areas Vulnerable to Groundwater Contamination by Pesticides in Canada.

MR. CASTRILLI: Q. And Mr. Kingsbury, you have a copy of that; is that right?

MR. KINGSBURY: A. Yes, I do.

MR. CASTRILLI: Mr. Chairman, I would note that these are excerpts from the report.

THE CHAIRMAN: Thank you.

MR. CASTRILLI: Q. Mr. Kingsbury, in the U.S. EPA list simazine was one of 45. Would you agree with me that in the Agriculture Canada list,

Potentially Leachable Pesticides, simazine is one of 86 identified?

MR. KINGSBURY: A. I'll take your word for the number. I would agree that they are -- it's one of the 86, if that's the correct number, rated by leaching potential in this list.

Q. Thank you. Perhaps for the assistance of the Board, could I ask you, Mr. Kingsbury, to turn to page 5 firstly of what is now Exhibit 738?

A. Yes.

Q. And we have Table 2.1 and 2.2. There is --- 2.2 is Categorization of Leaching Potential Values and the table itself has several categories: F for probable or known contamination; C for high potential for contamination; B for potential contamination, and so on.

Do you see that and do you agree?

A. Yes, I see it.

Q. Can I ask you to turn to page 7?

A. Yes.

Q. About midway down the page on the left-hand side the list of pesticides, in the middle of the page would be simazine?

A. Yes.

Q. And looking at the leaching potential --

A. That's category B.

Q. It's category B, which means it's potential contamination?

A. Yes.

Q. And just looking at the right-hand -- well, the right-hand side simply refers to volume. M, I believe is medium, which is referred to -- which is volume of use and that's at page 4.

So would you agree with me that Agriculture Canada perceives simazine to have a potential for contamination through leaching?

A. No, I would not agree with you on that and I'll expand on my reasons for that.

I have talked with the author of this study, Mr. McRae recently. He spelled out that this ranking of chemicals is based on three factors alone. The criteria for the ranking were the solubility of the material in water, the half-life of the material in soil, and its volatility. He noted that, and it is noted in -- on page 8 in note No. 9 that the ratings for leaching potential may change as more information becomes available; e.g., absorption data.

He indicated to me that absorption data

was not taken into account in rating leaching potential because it was not available for all 86 pesticides, but he did say that since the time this has been produced there has been consideration of additional data such as absorption data for a number of the chemicals that are included in this list.

And he said that for some - and he gave me the specific example of glyphosate, which you will note is ranked as the -- on page 6 as I believe the seventh highest, the chemical given the seventh highest leaching potential - that Agriculture Canada now recognizes the potential for glyphosate to leach will be very low when absorption to soil is considered.

He further indicated that this will be reflected in a new ranking which is currently being worked on and is expected later this year.

I would assume from what I know of the data on the absorption of simazine that it is likely to similarly -- if consideration of that absorption data is taken into effect, simazine will similarly perhaps be eliminated or will be lower in terms of a list of chemicals based on their leaching potential.

And Mr. McRae indicated to me that with respect to glyphosate the position I have indicated has been put in writing to the manufacturer and to the B.C.

Ministry of Forests and would in fact be available to this Board if they required it.

Q. Can you advise, Mr. Kingsbury, in what form the communication to you from Mr. McRae came?

A. I met with Mr. McRae a year ago. He was present at a presentation of mine and I have talked to Mr. McRae on the phone within the last week.

Q. So it's your understanding that a new backgrounder is going to be published shortly?

A. He indicated to me that there will in fact be a new ranking that he suggested would be available by the end of this year, and that it would reflect consideration of things like absorption data that is available as is indicated in note 9 on page 8.

Q. You will note, Mr. Kingsbury, that the other products or some of the other pesticides on this list include picloram which is listed as leaching potential F; is that right?

A. Which page will I find that on?

Q. Page 6. It is three below glyphosate.

A. Yes.

Q. F is probable or known contamination?

A. The leaching potential considering those three variables--

Q. Yes.

A. --in this study, yes.

Q. And hexazinone, leaching potential F, probable or known contamination?

A. That's correct. Again, I would point out that, as we've heard in -- we have had evidence submitted before this Board that, in fact, demonstrates lack of actual leaching in forestry sites in Ontario.

And, again, I would suggest that when that data is taken into consideration and this leaching potential list is re-issued, if it considers that data, that hexazinone in fact will be found not to be categorized as having probable or known leaching potential.

Q. And 2,4-D, same page?

A. Correct, and the same comments apply.

Q. High potential for contamination. L is large volume of use?

A. Which, of course, would take into account its predominance of its use in agricultural situations.

THE CHAIRMAN: Well, Mr. Kingsbury, are you telling the Board essentially that any of the rankings contained in this backgrounder are not necessarily accurate without proper absorption data?

MR. KINGSBURY: I'm telling you, Mr. Chairman, that that's what the author of this list told me, that in fact it only considers three criteria.

The reason glyphosate and simazine would be on there, I suspect, is because of their relatively high solubility in water which was one of the criteria suggested.

In the absence of considering things like absorption, as the author points out himself, the rating may be totally inaccurate.

THE CHAIRMAN: And that would be your opinion of this kind of ranking based on data that excludes absorption rates; is that correct?

MR. KINGSBURY: If it excluded absorption rates and other things, particularly in the presence of data that has been submitted on those things, it may give it an entirely inaccurate reflection of actual leaching potential.

THE CHAIRMAN: So would your opinion be that we should place very little weight on this document?

MR. KINGSBURY: Absolutely. In terms of, I would suggest it would be more relevant to place weight on the actual data carried out in Canada under forestry situations which is summarized in the ESSA

Document and other evidence that has already been submitted to the Board.

MR. CASTRILLI: Q. Mr. Kingsbury, can you refer me to the leaching data that's been submitted to this Board for simazine?

MR. KINGSBURY: A. I would refer you to the --

Q. The Weed Science Society of America. Is that Canadian data?

A. I'm not sure whether the study that is actually referenced in the herbicide handbook there, where it was carried out. I would suggest there are quite a number of studies that are reflected in the herbicide handbook statement regarding leaching potential of simazine.

Q. But you don't know whether any of them refer to Canadian conditions; is that right?

A. Not without seeing the reference.

Q. That's fine. Just note, Mr. Kingsbury, carbaryl is also on the Agriculture Canada list, same page, page 6?

A. Yes.

Q. And it is also identified as a high potential for contamination; is that right? That's what C stands for?

A. That's correct. Again, that is referring to all use patterns. I would suggest that my personal experience of the use pattern of carbaryl, which has been basically the material, to my knowledge, which has extremely limited use in Canada over the last five or six years, suggests that that C does not reflect forestry use in the material.

Q. Do we have any Canadian information on carbaryl that you filed as part of ESSA Document?

A. There have been environmental fate studies conducted with carbaryl in Canadian situations; yes, they were carried out in 1980 I believe in New Brunswick by the Forest Pest Management Institute.

Q. And that's reflected in the ESSA Document?

A. I would have to check that section to make sure those studies are in fact referenced there.

Q. Just for the record, Mr. Kingsbury, I refer you back to Exhibit 737, that's the U.S. EPA memorandum.

A. Yes.

Q. Looking at page 3 again, the third pesticide on the list -- sorry, page 3 of the priority 1 chemicals.

A. Yes.

Q. You agree that picloram is also on that list?

A. Yes, it's on this list.

Q. Now, I understand your testimony, Mr. Kingsbury, to be that simazine is moderately persistent in water with a half-life of 50 to 70 days?

A. Yes, I believe that's correct.

Q. And that's actually referred to at page 27 of the ESSA Document? It's the last paragraph.

A. That's correct.

Q. Are you familiar with a U.S. EPA Office of Drinking Water Health Advisory on simazine, dated August, '87?

A. Yes, you provided me with a copy of that.

MR. CASTRILLI: Mr. Chairman, I would like to make this the next exhibit.

THE CHAIRMAN: Exhibit 739.

MR. CASTRILLI: Mr. Chairman, this is the entirety of the document on simazine.

THE CHAIRMAN: Okay.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 739: U.S. EPA document entitled: Simazine, dated August, 1987.

MR. CASTRILLI: Q. Mr. Kingsbury, I have given you the entirety of what is now Exhibit 739?

MR. KINGSBURY: A. Mr. Castrilli, is it correct that pages 6 to 14 in what you have given me are pages that I was not given prior, is that the difference between the document you gave me and --

Q. Yes, that's right. What I gave you previously was the first five pages plus the references, and what I am now giving you is the entire document.

But in terms of what I am going to ask you, it relates to those portions you would have had last week. Okay. I ask you to turn to page 4.

A. Yes, I have it.

Q. The Health Advisory produced by the U.S. EPA in August, 1987 indicates that:

"Simazine residues (uncharacterized) may persist up to three years in soil under aquatic field conditions..."

And that:

"...dissipation of simazine in pond and lake water was variable, with half-lives ranging from 50 to 700 days."

Do you see that?

A. Yes, I see that.

Q. Would you agree that U.S. EPA found that simazine may persist in soil up to three years?

A. Under aquatic field conditions and I'm not entirely clear what they -- how they would define aquatic field conditions.

MS. MURPHY: Mr. Chairman, if I could just interrupt for one second. As you understand, the witnesses were provided with a piece of this document last week and now have the whole document.

I wonder if there is any possibility of just standing down discussion of this until after the break so they have an opportunity to review the entire document for cross-examination, just so that they know.

I mean, I don't know what's in the rest of this, it might be important for them to know what the complete document says.

MR. CASTRILLI: Mr. Chairman, the remainder of the document doesn't deal with these areas at all, and I'm only going to ask this witness questions on those -- on that part of the document that he has had for almost a week.

Surely by now he has been able to read those first five pages and, if necessary, gone and looked at the references. I don't think we need to stand the article down at all.

THE CHAIRMAN: Mr. Kingsbury, do you feel comfortable about answering questions on the first five pages without having read the full document?

MR. KINGSBURY: Yes. I believe from my cursory examination of the rest of those pages they primarily relate to health effects; is that correct, Mr. Castrilli?

MR. CASTRILLI: That's correct.

THE CHAIRMAN: Okay. I think we can proceed.

MR. CASTRILLI: Q. Mr. Kingsbury, I asked you, the U.S. EPA found that simazine may persist in soil up to three years, although the study you referred to in your summary of simazine suggests 3 months to 12 -- 3 months to 12 months; is that right?

MR. KINGSBURY: A. The half-life of 50 to 70 days in water, that was the study cited in the ESSA Document.

Again, I would be reluctant to comment without knowing what the nature of the aquatic field conditions were and, in saying that, I would like to know how was the material applied to water, was it an intentional application for experimental purposes or for vegetation control purposes, and what was the dosage of the material applied to water, what was the

nature of the aquatic system to which it was applied.

In the absence of such data, I can only comment in the most general of fashions on the values given.

Q. Mr. Kingsbury, in the preparation of the material by ESSA would they not have had an opportunity to acquire documents such as this groundwater -- or excuse me, this Drinking Water Advisory which summarizes the known work to August of 1987 on environmental fate?

A. If in fact the value came out of Flanagan, et al, 1968. I would note that Flanagan, et al is an unpublished study - and I am referring now to page 16 of the document, the reference list, where it talks about residue data for simazine in water and fish - unpublished study prepared in cooperation with the University of Maryland and others submitted by Geigy Chemical Company.

I would take from that that this study is in fact the property of Geigy Chemical Company and they would have submitted it into the -- to EPA, but it would not necessarily be a study available to the ESSA researchers and others.

Q. Well, that is certainly true for a study like Flanagan and one or two of the others.

There are also some there that are in the published literature; would you agree?

A. Well again, Carrs, 1969, unpublished study submitted by Geigy Chemical Company. We can continue through them, Larson, et al, 1966, unpublished study submitted by Ceiba-Geigy Corporation.

Q. Smith, 1975 in the Canadian Journal of Plant Science; is that unpublished?

A. That is a published study relating to persistence and movement of atrazine, bromocil, monoron and simazine in intermittently filled irrigation ditches.

I think you would agree, Mr. Castrilli, that if it's an intermittently filled irrigation ditch that obviously has some implications to the persistence of simazine in the soil substrate in that sometimes it's under flooded conditions and sometimes it's under unflooded.

As I say, I would require more details to be able to provide you with appropriate valid comments on the values you want me to comment on.

Q. Mr. Kingsbury, the document itself the Health Advisory, is a public document; is it not? Now, I have a copy. Surely you could have gotten a copy or the Essa reporters or researchers could have

gotten a copy.

THE CHAIRMAN: Mr. Castrilli, with respect, he's indicating that he doesn't want or is unable to give you useful and valid comments without appreciating some of the source documentation that went into the conclusions reached by this Drinking Water Advisory, and I don't know how much further you can go beyond that.

Sure if he had that source data he may be in a position to give you different comments, but he has stated his opinion, he doesn't wish to comment on it because he hasn't had available the source data.

MR. CASTRILLI: Mr. Chairman, you can appreciate my position. I have been asked to take on faith reports and references to reports that I have not been able to see nor have my experts.

It seems to me that I am certainly entitled to put this document, which is a public document, to this witness and say: Why wasn't ESSA capable, if I was capable, of referring -- of finding this document and referring to it and indicating that the references in it are to material they do not have access to.

But not leaving the impression that the only work done in the universe of work with respect to

simazine suggests that the half-life of simazine in water is only 50 to 70 days when, in fact, the reference in here says it can be 50 to 700 days.

THE CHAIRMAN: Well, Mr. Kingsbury, you didn't say conclusively; did you, that ESSA did not consider this document?

Did you not indicate that you had to check the sources in the ESSA Document to ascertain whether this was or was not looked at?

MR. KINGSBURY: It is not, to my knowledge, cited in the ESSA Document, but I would -- again, Mr. Castrilli, I would indicate that I don't think that there is any presumption by either ESSA or the Ministry of Natural Resources that the ESSA Document itself in fact makes reference to and that it took into consideration each and every piece of published or public literature on this topic matter.

In fact, such an exercise would be an incredibly complex and complicated exercise which would be outdated by the time it was published.

It is an attempt to present, for the purpose of this hearing, the evidence on environmental effects related to the use patterns that we are discussing for these pesticides, and I would suggest that particularly with a material like simazine,

probably 95 or 98 per cent of the published data might not be relevant to environmental effects in forestry use in Ontario.

I, therefore, don't feel that the fact that this particular Health Advisory public document not being referenced in or perhaps even considered by the ESSA researchers reflects inadequacy in their document.

MRS. KOVEN: It does raise a question though of how rapidly and up-to-date the exchange of information between Canadian government and American government takes place.

I think that the EPA is not seen as, in recent years anyway, as a body that goes off half-cocked and makes all kinds of proclamations about the effects of chemicals. I think there is a very thoughtful review process that is involved in that.

And would Agriculture Canada be the recipient of this document at some early stage?

MR. KINGSBURY: I would presume that they would certainly be the recipient of that, but that's based on an assumption.

MRS. KOVEN: And do they make a judgment that that is not relevant to forestry but is a concern of one of your other agencies?

MR. KINGSBURY: Given that this is basically a health advisory, I would not be at all surprised that they would seek some kind of comment on it from the agency they rely on for assessments of human health hazard.

MRS. KOVEN: So in fact some information that you might find fairly interesting depending on how aquatic field conditions could be described--

MR. KINGSBURY: Yes.

MRS. KOVEN: --might not reach you automatically?

MR. KINGSBURY: That's correct.

MR. CASTRILLI: Q. Mr. Kingsbury, continuing with the ESSA Document. I understand your testimony to be that simazine has a low tendency to bio-accumulate in animals and once absorbed is rapidly broken down into non-toxic metabolites that are rapidly excreted via the kidneys?

MR. KINGSBURY: A. That's correct.

Q. And that's actually set out at page 28 of the ESSA Document?

A. Yes.

Q. I believe you also indicate that in the ESSA report complete elimination in urine occurred within 12 to 26 hours in laboratory animals and 1 to 2

days in ruminants.

A. In laboratory studies using radioactive labelled material, yes.

Q. It's the same paragraph on page 28?

A. Yes.

Q. Just for the record, Mr. Kingsbury, what is a ruminant?

A. A ruminant is basically an organism that -- such as -- well, it encompasses cows and moose and deer that are classified as ruminants on the basis of the fact that they -- their stomachs process plant material.

Q. Thank you. I refer you again to Exhibit 739, page 5.

A. Yes.

Q. The heading under excretion?

A. Yes.

Q. The last bulleted item, it's a reference to a Hapkie, 1968.

A. Yes.

Q. An article that is in the published literature. It notes:

"The Drinking Water Advisory notes that Hapkie reported that simazine residues were present in the urine of sheep for up

to 12 days after administration of a single oral dose. The maximum concentration in the urine occurred from 2 to 6 days after administration."

Do you see that?

A. That's correct.

Q. Would you agree that that summary is significantly different from the finding that is outlined in ESSA?

A. I would agree that it would certainly indicate a different duration of simazine residues.

Again, I would make note that I don't think that in fact would cast any doubt that the finding that is documented in the ESSA Document is perhaps a -- is both a reliable statement and perhaps more reliable than the statement in the Hapkie thing, given that it's done using radio-labelled material, which I would suggest are easier to document the presence of and the levels of, and it's a study that is done almost 20 years later and I would suggest that certainly the methodology in the area of analytical chemistry has progressed quantum leaps in that period.

Q. Sorry.

A. That is not to say that the Hapkie study may not in fact reflect a real finding. Again,

it may be pertinent to the conditions under which that study was conducted, the dose level, as a for instance, any number of other factors.

Q. In any event, ESSA didn't review Hapkie; is that right?

A. That's correct.

Q. You said 20 years later. I'm not sure what you were referring to there.

A. In that the study that I talked about by Sassman, et al was a study published in 1984 as opposed to the Hapkie study which was published in 1968.

Q. I see. I'm sorry. So it's the Sassman study you are referring to?

A. That's correct.

THE CHAIRMAN: Mr. Kingsbury, is it usual in scientists looking at previous studies, given the state of technology today, to somewhat discount studies which were a fair number of years ago, in favour of whatever applicable data there may be in the scientific domain of much more recent vintage?

MR. KINGSBURY: It is almost universally the case that the previous literature would be reviewed and that where there was weight of evidence indicating some new understanding or lack of understanding in some

of the previous literature, that that would be spelled out. Since the time of Hapkie, studies by so and so, and so and so have shown that.

They might even give some suggestion as to why a previous study perhaps arrived at an inappropriate conclusion or why it in fact discovered a real phenomena, but there was some factor that had not been considered into why that phenomena took place.

DR. RITTER: Mr. Chairman, I wonder if I might just attempt to assist here, having some experience both in the conduct and in the interpretation of metabolism studies.

I'm not sure that we are not over interpreting the last sentence in the Health Advisory page 5 with reference to the Hapkie report. I don't read this to be at all inconsistent with what ESSA has said.

I think Mr. Castrilli was suggesting that there are significant differences in the excretory pattern and the time required for excretion of the chemical in sheep as compared to the more recent studies. I don't believe that is correct.

What the Hapkie summary here says is that residues were present in urine for up to 12 days, which may also mean that 90 per cent was excreted in the

first 3 days and that it took another 10 days for the balance to be excreted. That is quite typical and I'm not sure that the ESSA Document actually says anything different.

If you read the sentence carefully regrettably these sentences are always -- regrettably is perhaps the wrong word - but they are written by individuals who understand what they are trying to say and are never written for the purpose of cross-examination at some subsequent time, so they are perhaps not as clear as they might be.

But in the ESSA Document where these experiments have been done more recently with carbon-labelled simazine, it says that:

> "The elimination of radioactivity was eliminated primarily in the urine within 12 to 26 hours and 1 to 2 days in these larger animals."

And again, I suspect if you were to go back to these studies, these original studies I'm almost confident that that does not mean that 100 per cent was excreted in the first two days. I'm almost certain that it means the majority was excreted within the first two days, because wherever this kind of sentence is used, I can't think of a single case where

it's intended to impart anything except the impression I just tried to leave you with. So I really read these to be entirely consistent.

The other point that I think I should make is that when one talks about metabolism studies in mammalian species, a difference of a day or two insofar as the excretion for the majority of the metabolite is required, does not constitute a difference. If it took five or six days to be excreted to 95 per cent in sheep and took one or two in rats and three or four in cows, those would be considered to be nothing more than minor differences that are entirely attributable to the difference in species.

It would be very surprising if every mammalian species tested had an excretion pattern which was identical, in fact it would not only be surprising it would not be plausible.

So I think it would be -- in my view, it would be more correct to read these rather trivial differences because the Hapkie notation here does note that peak levels were achieved within about five days. That is the important feature of that, and I would not read an important difference between five days and one to two to three days. That's the same thing, that is nothing more than a difference in species.

In fact, if you were to repeat the same experiment in the same species you would find that there could be differences of a day, day and a half, 30 hours in the excretion profile of the chemical in urine.

THE CHAIRMAN: Except for steroids?

DR. RITTER: Steroids are --

MS. MURPHY: The subject of another hearing.

MR. CASTRILLI: Q. Continuing on page 5, Mr. Kingsbury, the U.S. EPA Health Advisory on this chemical also indicates that:

"A study in rats and rabbits found that the metabolites of simazine retained the triazine ring in tact."

Do you see that, the first bulleted item on page 5?

MR. KINGSBURY: A. Yes, I see it.

Q. And the Health Advisory refers to a further study in goats and sheep which showed that:

"The metabolites identified in the urine of animals receiving the ring labelled compound provided no evidence to suggest that the triazine ring was metabolized."

It's the second paragraph, same page.

A. Yes, it says that.

Q. Would you agree with me that this study or these studies are also directly contrary -- or are contrary to the ESSA reported studies which suggest that simazine is rapidly broken down?

A. What the ESSA Document talks about is rapid and complete elimination. Now, these metabolites were identified in the urine. That suggests to me that they were in fact eliminated from the test organisms.

Q. Mr. Kingsbury, the paragraph I'm referring to in the ESSA report is the second full paragraph on page 28 which says in part:

"Simazine is rapidly broken down to non-toxic metabolites."

Whereas the U.S. EPA Office of Drinking Water Advisory indicates that the triazine ring was --

"There was no evidence to suggest that the triazine ring was metabolized at all."

Surely those two sentences are not consistent with each other?

A. What the EPA document suggests is that those metabolites were found in the urine. I would ask you to entertain the possibility that it's difficult for the organism to metabolize them once they

are excreted. And in terms of the effect on the organism, it's irrelevant whether the material is excreted in -- as parent compound or as a metabolized compound.

THE CHAIRMAN: Doesn't the ESSA Document, Mr. Castrilli, indicate, that are rapidly excreted by the kidneys, next sentence -- or part of the same sentence.

MR. CASTRILLI: It's not the same thing as saying they are metabolized.

DR. RITTER: Mr. Chairman, I would disagree. That is the same thing as saying they are metabolized. What the phrase metabolized means in mammalian species, the intent of the phrase is to mean broken down to the point of excretion a.

It doesn't make reference to the size of the moiety to which the component may be broken down, but only to the body's capacity to rid itself of that insult.

If, in this particular case, the smallest unit which can be excreted becomes the ring, then metabolized and excreted are synonmous phrases in that paragraph.

MR. CASTRILLI: Q. These are both studies -- or all three of these studies in the Office

of Drinking Water report are not referred to in ESSA; is that right?

MR. KINGSBURY: A. I will take your word for it. I have checked the Hapkie study but not the other two.

Q. Let's just refer again to the full paragraph on the top of page 28. It says:

"The ESSA report gives the following citation for its statement that simazine has a low tendency to bio-accumulate in animals and once absorbed is rapidly broken down into non-toxic metabolites that are rapidly excreted via the kidneys."

And that is the sentence we have been talking about?

A. Yes.

Q. Are you familiar with the pesticide background statements on herbicides produced by the U.S. Forest Service?

A. Yes, I am.

Q. That is in fact what the Sassman article is. I have provided this to you already, Mr. Kingsbury.

A. Yes, I have it.

MR. CASTRILLI: Mr. Chairman, I ask this be made the next exhibit.

THE CHAIRMAN: Exhibit 740.

---EXHIBIT NO. 740: Excerpt from a document entitled: Pesticide Background Statements, Volume I. Herbicides from the Forest Service, U.S. Department of Agriculture.

THE CHAIRMAN: Are you going to be long on this document, Mr. Castrilli?

MR. CASTRILLI: No, actually at the conclusion of this document we can probably break for lunch.

THE CHAIRMAN: Very well.

MR. CASTRILLI: Q. Mr. Kingsbury, you have a copy of this; is that right?

MR. KINGSBURY: A. Yes, I do.

MR. CASTRILLI: Mr. Chairman, I should say this is again excerpts from this document.

Q. Mr. Kingsbury, you would agree that this is in fact Sassman -- or this excerpt is from Sassman?

MR. KINGSBURY: A. The excerpt you are referring to being specifically on page 27 of that?

Q. 28.

A. 28. And, again, you are referring to...

Q. Page S-27. And the paragraph I am referring to is at page 28 of the ESSA Document, and the paragraph I am going to refer you to in Exhibit 740 is the first paragraph under animals. Do you have that?

A. It makes the same statement, but it doesn't -- unless I'm missing something here, Mr. Castrilli, it doesn't reference Sassman as the authority for that statement.

Q. No, you don't understand, Mr. Kingsbury. The document that I have given you, which is Exhibit 740, is Sassman.

MS. CRONK: Is that a question?

MR. CASTRILLI: No, it's a statement.

MR. KINGSBURY: Okay. You are referring to the U.S. Forest Service pesticide background statement on simazine?

MR. CASTRILLI: Q. That's right. This was prepared by Sassman for the U.S. Forest -- well, for the Department of Agriculture.

MR. KINGSBURY: A. Okay, I understand. I'm sorry.

Q. So when we look at page S-27 of Exhibit 40 -- excuse me, Exhibit 740--

A. Yes.

Q. --you see that the first sentence in Exhibit 740 under the heading animals is the same sentence that is referred to at page 28--

A. That's correct.

Q. --of the ESSA Document; is that right?

A. That's correct.

Q. Now, the reference at the end of that paragraph is to appendix -- sorry, the reference in Exhibit 740 is to Appendix F which I have reproduced as pages S-79 and S-80.

A. That's correct.

Q. Now, I want you to look at Appendix F. Can you advise me where in Appendix F there is a citation to evidence for the statement that the metabolites are non-toxic to animals?

A. My understanding of that statement is that they are talking about non-toxic to the organism from which they were excreted, but in fact in these studies there were not toxic effects associated.

Q. These are studies about metabolism; aren't they?

A. They're metabolism studies that are saying that the simazine -- in these studies, where the behaviour of simazine in the organism was studied, that

simazine was metabolized within the organisms or excreted from the organisms in forms which did not exert toxic effect on the organisms.

That's my understanding of the word non-toxic metabolites as it's used in the second line of that statement from Sassman.

Q. Where in Appendix F are the references to non-toxicity of the metabolites?

A. I would take it that in the studies done by Dodson and Mayfield and the other authors here, that the indication of the lack of toxic effects is contained within those studies.

THE CHAIRMAN: What are the words "no adverse effects were noted" under simazine on the second page under rainbow trout; I mean, what does that mean?

MR. KINGSBURY: I would take it to mean a lack of toxic effects.

MR. CASTRILLI: Q. Do any of the other studies on that two-page list make any such statements?

MR. KINGSBURY: A. Without looking at those studies themselves, I couldn't answer that question for you. I would assume that they would make comments on the health of the organisms or any effects observed on the organisms. That in fact is very basic

data that would be collected in conducting a study such as this.

Q. Mr. Kingsbury, isn't it true that all the ESSA Document -- or ESSA exercise did was look at Sassman and that sentence in Sassman and simply lift it and place it in the ESSA report and, as far as you know, there was no review of the documents in Appendix F?

A. The ESSA Document doesn't pretend that they reviewed the documents presented in Appendix F. They made reference to a review that had been done by Sassman and Sassman indicates the sources for his information.

Q. And Sassman is not a study; is it?

A. Sassman is not a study.

THE CHAIRMAN: Ms. Cronk?

MS. CRONK: I'm sorry, Mr. Chairman, I didn't rise before but my friend asserted to the fact that this is Sassman. I don't impune the accuracy of that, but I don't have a clue, frankly, sir.

The witness didn't confirm it and now he is suggesting it isn't is study. If he wants to establish before the Board what the status of this document is or the full document is, there is a way to do that to assist him.

MR. CASTRILLI: Mr. Chairman, with all due respect to Ms. Cronk, this is a document that is referred to in the ESSA material.

I don't have to reproduce the entirety of the document, and this witness can satisfy himself as to what it is by going and getting the copy that he mailed me or was mailed to me. That is hardly the point.

What is at issue, however, is that the Sassman exercise was not a study per se, it was another literature review and what the literature reviewed in this case by Sassman with respect to the non-toxicity of metabolites is, is Appendix F.

MS. CRONK: Sir, there is a time to argue that and, in my submission, it isn't now. If he wants the witness' view as to what the Sassman work was or was not, he should attempt to illicit it.

What we are getting now is the lawyer's characterization of a scientific document, it may be entirely right; it may be entirely wrong. In my submission, that's not the way to do that.

MR. CASTRILLI: Mr. Chairman, my submission is that submission is completely missing the point of the exercise.

The question is: What, if anything, in

Appendix F dealt with the non-toxicity of the metabolites that permitted the ESSA exercise to simply lift the sentence holus-bolus from Sassman and place it into the ESSA Document and leave the impression, as it clearly is attempting to do, the metabolites were non-toxic.

THE CHAIRMAN: Well, is there anything in the Appendix F that indicates that there were toxic effects?

MR. CASTRILLI: I'm sorry, Mr. Chairman --

MR. KINGSBURY: There is no indication of that.

THE CHAIRMAN: And there is a statement saying with respect to one of the papers that there were no adverse effects; is that correct?

MR. KINGSBURY: That's correct.

MR. CASTRILLI: In relation to fish.

THE CHAIRMAN: In relation to fish. Would it be your opinion, Mr. Kingsbury, that if there were toxic effects they would be noted in some of these studies?

MR. KINGSBURY: It would in fact be highly surprising to conduct a study of this nature and not document them.

THE CHAIRMAN: Would it also be surprising if there were not toxic effects that that conclusion would have to be stated in those terms?

MR. KINGSBURY: I would be almost certain that they would in fact, you know, be represented in the conclusions of the study. They obviously haven't.

THE CHAIRMAN: So, in other words -- I guess what I am getting at: Is it automatically assumed that if a study is conducted and does not specifically reference a toxic effect, that there are no toxic effects?

MR. KINGSBURY: I think that's a fair assumption.

MR. CASTRILLI: Q. Were these studies about toxicity, Mr. Kingsbury?

MR. KINGSBURY: A. They were about metabolism of simazine.

Q. Are they about toxicity, or do you know?

A. They are about the fate and movement and excretion of simazine within the organism. Obviously, the need to have simazine present in the organism in order to conduct the study means that toxicity is an obvious consideration of the study.

Q. But you don't know because you

haven't looked at any of the studies; have you?

A. I haven't recently had firsthand look at any of these studies, that's correct.

Q. And you hadn't looked at them at the time the ESSA Document was prepared; is that right?

A. As we've said before, Mr. Castrilli, I wasn't part of the ESSA -- preparation of the ESSA Document, I was a reviewer of the ESSA Document.

Q. And, in your capacity as a reviewer, you didn't review the studies listed in Appendix F; is that right?

A. I didn't go back and look at the secondary references that were referred to in primary references of a great majority of the studies, Mr. Castrilli.

I would suggest to you to do so would have taken an inordinate amount of time for any reviewer to do. At some point in reviewing scientific literature one has to basically accept that there has been a building of literature on literature and that it's impossible and infeasible to go back and check each and every conclusion drawn from somebody else's publication.

THE CHAIRMAN: Dr. Ritter, is it usual in scientific reviews of scientific literature to go into

the source documentation, the primary source documentation and then, if the primary source documentation also references subsidiary documentation, to go into that as well?

Is that normal for a reviewer of a scientific article?

DR. RITTER: No.

THE CHAIRMAN: What, in your opinion, is the normal methodology employed by scientists in reviewing other scientific material?

DR. RITTER: If, for the purposes of this hearing, I can call myself a scientist, I have been asked to review documents, which is I think what we are talking about here, perhaps 70 or 80 times in the last 10 years and during that time -- I think it's a convention to review the document for -- one is asked to review a review document because one is considered to be an expert in the field clearly, that's why one is asked to review a review document. So that one brings to that assignment a sense of experience and a general knowledge of the literature.

I think there is a temptation to go back to the original source material if there has been a very obvious and blatant misrepresentation of information with which the reviewer is familiar, or if

there has been an obvious and deliberate omission of information with which the reviewer may be familiar but, notwithstanding those two examples, I see the responsibility of a reviewer to review the context in which a review is written; that is, has it imparted a reasonable representation of the state of knowledge on the given subject, rather than to verify firsthand the conclusions of every source material cited, because of course if you go back to the source material they, in turn, will be quoting source material.

Mr. Kingsbury said --

THE CHAIRMAN: Would really - just to interrupt you there - would really the only way to verify that kind of source material would be to repeat the experiments yourself, if you go back far enough?

DR. RITTER: That's correct. I would suggest to you that if it involved re-verifying the whole chain of source material reference to reference to reference, I suspect nobody would undertake to review a review article.

THE CHAIRMAN: Thank you.

MR. CASTRILLI: Mr. Chairman, before I embark in a new area, this will probably be a good place to break for lunch.

THE CHAIRMAN: Okay. I think we will

adjourn until 2:00 p.m.

Thank you.

---Luncheon recess taken at 12:45 p.m.

---On resuming at 2:10 p.m.

THE CHAIRMAN: Thank you. Be seated.

Dr. Ritter, had you made any inquiries over the lunch hour?

DR. RITTER: Yes, sir, I have. The first week of September is the week of Labour Day--

THE CHAIRMAN: Yes.

DR. RITTER: --and I don't have a calendar in front of me, I don't know what date that is, but I would be unavailable the Wednesday of that week. I would be available the Thursday and Friday and presumably the Tuesday, but I would have to be back in Ottawa for the Wednesday.

I don't know if you feel if it will be possible to conclude with two additional days, that would be the Thursday and the Friday of that week.

THE CHAIRMAN: Well, what we are attempting to do is, we have to contact the Ontario Anglers & Hunters, but if Mr. Castrilli is finished tomorrow late in the day, we are hoping that we can get the Anglers & Hunters on in one day.

They have estimated one day and we would

hope that they can fulfill that obligation, in which case we would even contemplate starting relatively early on Thursday.

There is a problem getting out Thursday night for one of the Board members. If we go out later in the afternoon -- in the evening, rather, it means a four to five-hour wait in an airport to get back to Sudbury, and if our plane is late coming out of here, then he misses the Sudbury plane altogether. There is a half hour leeway and it is a different terminal. So that is a bit of a problem.

But what we are suggesting is, is that if Mr. Castrilli is finished and the Anglers & Hunters are ready, as they should be, to go on Thursday, we might start quite early on Thursday and still get in a relatively full day of testimony, bearing in mind that the normal start would be nine.

We understand that the evening before some of us may not be getting to sleep as early as normal but, nevertheless, it should still be possible, I would think, to get up in the morning and start early if we have to. It has been an unusual week in terms of hours, but we have to remain flexible if we can.

Then, if the Anglers & Hunters did complete their testimony in the day, I would think that

two days should be adequate for the remaining parties, given their estimates, as well as re-examination.

MS. MURPHY: I would suspect, Mr. Chairman, that by the end of this week we will probably have a pretty clear idea whether we need one day, which presumably can be the 5th, or two days which would be the 7th and 8th. I'm sure one way or the other we can accommodate it by the end of this week.

THE CHAIRMAN: Yes. The concern is not whether it is one or two, it is whether we need more than two.

Don't forget, we have Ministry of Environment and Treaty No. 3, Anglers & Hunters and NAN and yourself, and really all we have this week is one more day left after Mr. Castrilli.

Okay, we might as well not waste any more time.

MR. CASTRILLI: Mr. Chairman, if I can be of any assistance, perhaps at the end of today, when I have a better sense of how much is left, we can talk about when we might start tomorrow.

THE CHAIRMAN: Okay.

MR. CASTRILLI: To ensure that I actually do finish tomorrow.

THE CHAIRMAN: Very well.

MR. CASTRILLI: Q. Mr. Kingsbury, continuing with you, I understand your testimony to be that -- and for the purposes of this I will just refer you to the ESSA Document.

A. Yes. Page...?

Q. Page 28.

THE CHAIRMAN: Excuse me, Mr. Castrilli. If Mr. Mander is listening, would he mind coming in for a moment. Thank you.

MR. CASTRILLI: Q. Page 28, under the picloram heading.

A. Under which, picloram?

Q. Picloram, yes. Your position is as stated in the first paragraph, that because picloram is applied only by injection in Ontario and because it is strongly retained by vegetation, the fate of picloram in soil, water and air is not particularly important or of concern. Is that a fair summary of your position?

A. I guess my position would be that the use pattern has dramatic implications for the fate of the material in the environment.

Q. Well, do you agree with the paragraph?

A. Basically I agree in that, because of the specific use pattern, the fate of the material can

be predicted and studies address that fate when it's happened in that -- when it's applied in that fashion.

Q. That's fine.

A. And that they would suggest that, in fact, the environmental fate of this material under the use pattern contemplated in Ontario does not pose an environmental hazard.

Q. Can you confirm for me, Mr. Kingsbury, that picloram will exit the roots of trees and will become available to other plants in that manner?

A. I am aware that where picloram has been sprayed onto foliage there have been lab studies done suggesting that it's capable of moving out of the root system into nutrient solutions in which those trees are growing.

I'm not aware that this has been demonstrated following stem injection in a natural environment.

Q. You are familiar with an article by Reid and others on root exudation of herbicides by woody plants?

A. I believe it's a note that is published in the Journal of Nature.

Q. Yes, that's right.

MR. CASTRILLI: Mr. Chairman, I ask this be made the next exhibit.

THE CHAIRMAN: Okay. That will be Exhibit 741.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 741: Article on root exudation of herbicides by woody plants, Dept. of Forest and Wood Sciences, Colorado, by Reid, et al.

MR. CASTRILLI: Q. Mr. Kingsbury, the authors of this article with the Department of Forest and Wood Sciences in Colorado note that they demonstrated in experiments in 1970 that significant quantities of picloram were lost from the roots of ash and maple trees.

Do you see that, the first paragraph?

A. Under laboratory conditions of -- that's correct.

Q. Were you aware of this possibility?

A. I'm aware of considerations of the fate of picloram and other herbicides that are injected or painted onto tree surfaces in a general fashion, I wasn't aware of this particular reference.

Q. The authors note that:

"Root exudation of exogenous compounds

has been shown to affect neighbouring plants."

I'm referring to the first paragraph.

And that:

"Since the studies that were done in the early 1960s, the exudation of 2,4-D and picloram, both exceptions to the above class of compounds, has also been shown."

Are you familiar with that?

A. The first -- when you refer to root exudation of exogenous compounds, from my understanding of that, that is talking about a general phenomena where some plants in fact exude compounds into the environment. These are -- originally the work was done on natural chemicals that -- plant chemicals that the plants themselves produce, and that these can affect neighbouring plants as a for instance.

It is in fact one way in which some plants seem to be capable of reducing competition by chemically impacting through naturally occurring substances on other plant species around them.

In terms of your second quote, exudation of herbicides in particular, basically what this is saying, that there has been some evidence that these two compounds, herbicides are exceptions to the general

rule, that it is only families of compounds produced within the plants that are exuded.

Q. That's right. So if I understand the essence of the article, and if you would confirm this for me I would appreciate it, the capability -- the possibility of herbicide leaving the root of the plant sprayed or injected through the roots and becoming available to other plants through the soil system, is a possibility that is outlined in this article?

A. What this article demonstrates is that that has -- that in fact occurs when picloram is applied to foliage at sub-lethal dosages. And I think that those are important considerations of the conclusion.

One, it refers to material that is applied to foliage. There is not sufficient material applied to kill the plant system which, as you can imagine, has some rather strong implications for the ability of something like exudation of the chemical to occur in the plant system. It would occur to me to be largely common sense to say the plant would have to be alive to actively be involved in such a process.

And it also says that those materials are exuded into nutrient solutions in which these plants are contained. It does not say whether in fact this

phenomena occurs into a soil system. Naturally, a nutrient system would have considerably more opportunity to be involved in the transport and movement of those chemicals out of the root system than soil particles might be.

Q. The article goes on to state, and I'm now referring to paragraph 3:

"Because of the reported persistence of picloram in soils, exudation of this growth regulator may be of greater ecological consequence."

Do you agree with that assessment?

A. I'm not sure that it's a -- that this study in itself has done anything to demonstrate ecological consequences.

In the first place, to my -- you know, by my reading of it, it has suggested this may happen, but it hasn't demonstrated that it will happen under the use of picloram we are discussing which would be applying the material not to foliage but directly to the stem of the tree in lethal dosages and then a concern would be whether that picloram then moved into the soil system surrounding the root system on those trees.

Q. Let me ask you, Mr. Kingsbury,

whether it's applied to the foliage or it's applied to the stem, will it not exit, if it's going to exit, via the roots?

A. Certainly we know that picloram will translocate but, as you can imagine, the dosage, whether in fact you have a toxic -- a lethal dosage to the plant system is going to have a great deal to say as to how far that process will proceed.

Q. Well, whether or not we have a toxic dosage, isn't it clear that it would - whether it was applied to the foliage or applied to the stem, it's going to leave through the roots?

A. No, it is not at all clear.

Q. It is not at all clear. That's fine.

THE CHAIRMAN: Is what you are saying, Mr. Kingsbury, that the plant definitely has to be alive in order to exude it from the roots.

MR. KINGSBURY: I would suggest that that is very clearly the case and, in fact, there are studies that demonstrate that in dead plant tissue picloram does not move.

THE CHAIRMAN: So if a lethal dose is applied, the plants dies, there will be no transfer.

MR. KINGSBURY: I think that's implicit, yes.

THE CHAIRMAN: Thank you.

MR. CASTRILLI: Q. Mr. Kingsbury, wasn't the purpose of this experiment to in fact kill the ash and the maple?

MR. KINGSBURY: A. No, it was not. The experiment says very succinctly that:

"Labelled picloram was applied in sub-lethal dosages."

I refer you to the second sentence of the second paragraph.

Q. Do you know what the label says for this type of herbicide with respect to root exudation?

A. I would suspect the label does not say anything about root exudation.

Q. That is fine. The authors go on to note:

"In order to more fully understand the physiological and ecological effects of using growth regulatory substances in woody plant control, consideration must be given to the possibility that significant amounts of herbicides may be exuded from plants."

Do you agree with that?

A. From roots.

Q. Excuse me, from roots?

A. It certainly is suggesting a pathway by which residues may end up in a portion of the environment.

I would suggest that the database contains field studies that would consider and take into consideration the possibility of that pathway in measuring residues and that we have, in fact, data available that allows us to make assessments of the ecological effects of using the growth regulating substance in that fashion.

Q. Mr. Kingsbury, the article itself refers to the issue of exudation of picloram as having been known since 1965. Do you see that reference in the first paragraph, it's to References 9 and 10?

A. Yes.

Q. Can you confirm for me that no mention of this possibility is made in the ESSA report?

A. I believe -- I would have to look at the specific documents that are cited in the ESSA report that support the conclusion there that several studies indicate the compound is quite stable and remains largely in tact.

Those studies may in fact have looked into that, but I wouldn't know without referring

directly to those studies.

Q. Well, Mr. Kingsbury, just looking at pages 28 and 29, which are the only places where you discuss picloram in this context, would you agree with me that nothing is said there about root exudation?

A. Nothing specifically about root exudation, but what is said is that picloram within the plant is quite stable and remains largely in tact.

One could take that to indirectly include the possibility that a great deal -- significant quantities of picloram move outside of plants through exudation from root systems.

Q. In any event, it wasn't dealt with in those five pararaphs; is that right?

A. Not the topic of root exudation specifically.

Q. Now, I also understand your testimony to be that picloram does not appear to be subject to much off-site movement; is that right?

A. Yes, that is stated in the ESSA Document.

Q. We have already looked at what is now Exhibit 737 which is the U.S. EPA groundwater initiative which talks about that issue.

Let me just refer you instead to a

document I provided to you. And you are familiar, I assume now, and have had a chance to review the guidance documents for the reregistration of pesticide products containing picloram?

A. Yes, I have the document.

Q. I have also provided you with a short excerpts and I have since provided your counsel with the entirety of the document as I have it, although I understand there is more to it than even I provided here.

MR. CASTRILLI: But for our purposes, I would like to make the larger of the two documents the next exhibit.

Q. Mr. Kingsbury, do you have the larger of the two?

MR. KINGSBURY: A. No, I believe I have the abbreviated document.

MR. CASTRILLI: Mr. Chairman, these are excerpts from the reregistration document on picloram, the first 36 pages. (handed)

I would like to make it the next exhibit.

THE CHAIRMAN: Exhibit 742.

---EXHIBIT NO. 742: U.S. EPA Document entitled: Guidance for the Reregistration of Pesticide Products Containing Picloram as the Active Agent.

MS. MURPHY: And for the record, the part previously provided to the witnesses were pages 5, 9, 10, and 21.

I requested the copy of the complete document, received it yesterday and copied it last night, but the witnesses have not had the opportunity to look at that.

MR. CASTRILLI: Mr. Chairman, I'm only going to be dealing with those particular pages today and we will deal with the other pages, if necessary, tomorrow, and that is also true for the full simazine document.

Q. Mr. Kingsbury, can I refer you to page 21 which is one of the pages you would have previously had?

MR. KINGSBURY: A. Yes, I have it.

Q. Referring to the top of the page under the heading Groundwater Contamination that picloram has a propensity to leach into groundwater.

A. That's what it says, yes.

Q. Do you agree with that assessment?

A. I'm not sure that I would agree with it in the context of the studies relevant to forestry use situations.

Q. And what studies are those?

A. Well, if we consider that right-of-ways in the context of Hydro lines, et cetera, are basically comparable sites to forestry sites. In many situations they are, in fact, integral parts of the forestry sites.

The work that has been done by Suffling, et al, regarding movement of picloram off a treated right-of-way site would be one of the studies. And also the study done by Bjerke and Dishberger, Picloram Movement from a Site in West Virginia, which I believe is a forestry site. Those are both cited in the ESSA Document at the bottom of page 28.

Q. Do you have the Bjerke document?

A. Not with me.

Q. It is a Dow Chemical report. Is it one that's otherwise available to anyone?

A. I would assume it was available to the ESSA review panel.

MS. MURPHY: Every document that's cited in the ESSA review panel has been made available on request to any person who asked for it, including Mr. Castrilli.

MR. CASTRILLI: Q. And what do we know of the soils that were tested in that study? More importantly, what do you know of the soils that were

tested in that study?

MR. KINGSBURY: A. I couldn't address the nature of the soils without having the studies in front of me.

Q. And what about the Suffling report, what do you know of the soils there?

A. The same comment applies.

Q. So basically you don't know; is that right?

A. I don't have that information with me at hand, that's correct.

Q. Can you also confirm for me that picloram is consistent and mobile and has a high potential to reach groundwater? We are looking at paragraph 3 of page 21 of what is now Exhibit 742.

MS. MURPHY: I am just going to have to interfere for a minute here. It says -- the document that the witness was given, this page, indicates at the top of it:

"Based on information previously found in this document..."

And then it draws certain conclusions:

"Based on information in the environmental section we draw these conclusions."

Without having had an opportunity to look at the entire document, I'm not certain how the witness can comment on that, Mr. Chairman.

THE CHAIRMAN: I think that's a fair comment, Mr. Castrilli.

MR. CASTRILLI: I'm content to deal with this tomorrow, Mr. Chairman.

THE CHAIRMAN: Very well.

MR. CASTRILLI: Q. Mr. Kingsbury, your evidence has also been that in Ontario picloram would only be expected to be present in animals that ingest plants treated with picloram; is that right?

MR. KINGSBURY: A. That's correct.

Q. Dr. Ritter and/or Mr. Kingsbury, can you confirm that recent studies have shown there may be a significant increase of small intestinal adenocarcinomas or tumors among animals grazing on -- in particular, sheep grazing on plants contaminated with phenoxy and picolinic acid herbicides including picloram?

DR. RITTER: A. You are referring, Mr. Castrilli, to a report which you made available to us I believe on Friday. If you are asking me to confirm that the report which you circulated says that, I am delighted to do that.

If you are asking me to confirm that that report, therefore, implies that picloram causes adenocarcinoma of the intestinal tract, I cannot confirm that. I'm not sure what your question is. The author of the report which you provided to me said what you said he said.

Q. At least we're that far. Let's put the document on the record and we can talk about your areas of disagreement.

MR. CASTRILLI: Mr. Chairman, I would ask that this document, which is entitled: Phenoxy and Picolinic Acid Herbicides and Small-Intestinal Adenocarcinoma in Sheep by Newell, Ross and Renner, 1984, the Lancet, be made the next exhibit.

THE CHAIRMAN: Exhibit 743.

---EXHIBIT NO. 743: Document entitled: Phenoxy and Picolinic Acid Herbicides and Small-Intestinal Adenocarcinoma in Sheep by Newell, Ross and Renner, 1984.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

MR. CASTRILLI: Q. Dr. Ritter, we know you have a copy. Mr. Kingsbury, do you have your copy?

MR. KINGSBURY: A. Yes, I do.

MS. MURPHY: Do you have an extra copy for Dr. Ritter. He is having a little difficulty

locating his copy with all the material he has in front of him.

MR. CASTRILLI: Q. Dr. Ritter, you lack a copy--

DR. RITTER: A. Yes, if you have one.

Q. --in all of that?

A. I have seen it.

Q. (handed)

A. Thank you.

Q. Dr. Ritter, this is an article that appears in the Lancet, an international medical publication?

A. Yes.

Q. Articles that appear in this document would normally be peer reviewed?

A. Normally, yes.

Q. If we can begin on the first page, page 1301. We are looking at the summary:

"Exposure to phenoxy..."

And they use thereafter the acronym Ph:

"...and picolinic acid..."

And they use thereafter the acronym Pi:

"...herbicides, or both (Ph Pi) was associated with significant increases in tumor rate. The increase in rate was

significant for exposure to each of the three herbicide groups."

Just for the record, Dr. Ritter, picolinic acid would include the family that includes picloram?

A. Yes.

Q. Now, if I can just take you to page 1304 and we are looking in the last full paragraph on the left-hand side of the page, the second sentence, and they refer to:

"Their data suggested..."

And they are referring to Table 5 which is on page 1303:

"...suggested a picloram effect in addition to the observed phenoxy effect."

And they go on to note that:

"....that, however, the population sample exposed to Pi alone was very small and the association weak and it is possible that the Pi effect noted in the sheep exposed to combined PhPi herbicides was confounded by the Ph effect. Nevertheless, we believe the associations with both Ph and Pi herbicides should be explored."

Do you agree with that assessment?

A. I am now trying to understand your question. The authors have indicated that they feel that the Pi effect alone was very small and the association was weak and that, in all likelihood, the association -- they say:

"It is possible that the Pi effect noted in the sheep exposed to the combination of herbicides was confounded by the Ph effect."

And then they go on to say:

"Nevertheless, we believe the association...should be explored."

As a scientist, I believe any possible association should be explored.

It is interesting to note perhaps, Mr. Castrilli, that although this paper was published in 1984, peers of this particular group from the Department of Veterinary Science in New Zealand perhaps don't share the enthusiasm that you and I might have for exploring this work, because I know of no piece of work that's ever been published since that date on this topic, from which I would conclude that others have not considered this to be a very fruitful or interesting area to explore.

Q. So we can take it that the registration process in Canada has not addressed the long-term or chronic effects in wildlife of these herbicides; is that right?

A. You can't take that from me. I don't assess long-term effects in wildlife.

Q. Well, let's put the question this way: Does the registration process in Canada assess long-term impacts with respect to wildlife?

A. Again, I can't answer that question. I can tell you what the registration requirements are for Health and Safety evaluation in Canada.

I tried to make my position clear, in that I am not here representing the registration authority but merely the Minister of Health, and the registration requirements do indeed require long-term chronic toxicity testing in mammalian species; in fact, in two mammalian species.

Q. But that's the mouse and the rodent under laboratory conditions; is that right?

A. That's correct.

Q. It's not wildlife in the wild?

A. I don't know how one would do long-term studies on wildlife in the wild because, as soon as you contain them to do the study, they are no

longer wildlife in the wild.

But that aside, I can't answer your question, that's what I'm saying. I'm not aware of what the data requirements are to assess long-term, short-term or other effects in wildlife.

Q. What about traditional sport hunters or native people who eat wild food that may be contaminated with this product; should we be concerned about that?

A. Again, I would refer you to the document prepared by Dr. Crump. He has addressed that question at some length and he has provided estimates based on projections of consumption of meat and fish, otherwise, that may be contaminated at maximum possible levels with picloram.

I can refer you to the specific sections, if you like, and I can give you an estimate of the risks which have been projected.

Q. Could you give me the page numbers rather than the sections?

A. Yes. Estimate of environmental exposure through ingestion of food is covered in a section beginning with page 61.

The section on picloram is contained specifically on page 66, and then goes on with the risk

assessment for picloram in Section 9 of that document beginning on page 221, specifically for assessment of potential carcinogenic risks associated with ingestion of food which may be contaminated with picloram.

And if you were to -- I seem to have done it to myself again. Every time I go through the document I reorder the pages and page 221 is in here somewhere, but...

Does somebody -- I'm sorry, if somebody has an orderly copy of this document...

MS. BLASTORAH: (handed)

DR. RITTER: Thank you. I am reading now from the section which I --

THE CHAIRMAN: What exhibit number is that?

DR. RITTER: I'm sorry?

THE CHAIRMAN: What exhibit number?

MS. CRONK: Exhibit 716, Mr. Chairman.

THE CHAIRMAN: 716.

MS. CRONK: It is the one you don't have, sir, it is being copied.

THE CHAIRMAN: Oh, the big one.

MR. CASTRILLI: Q. Dr. Ritter, if you don't have the pages perhaps you can simply advise us at some point after a break.

DR. RITTER: A. If I don't have the pages?

Q. Sorry, if you don't have the pages readily handy.

A. No, I do have the pages.

Q. Oh, all right. Then...

A. The sections that I indicated to you were from the section on risk assessment for picloram, and if you refer specifically to -- it depends which effects we are talking about. If you are referring to cancer, there is a variety of effects in this document which have been modelled.

If you refer specifically to page 239, if you are interested in the cancer risks, I think the effects to which you were alluding, the risks which have been estimated from the ingestion of - and I will give you a list here - dermal absorption, ingestion of water contaminated with picloram, ingestion of wild meat contaminated with picloram - and I think that was the example you were referring to specifically - ingestion of fish contaminated with picloram, ingestion of wild berries contaminated with picloram, and ingestion of garden vegetables contaminated with picloram.

Again, as Dr. Crump has done throughout

this document, the risks which are projected here are based on what he refers to as a more reasonable case, which is a case he speculates would be the type that most might encounter, through to a worst-case, which is unlikely to be encountered by anyone.

And I am going to give you the estimates for the worst-case, so that the actual case would be expected to be somewhat better.

The worst-case estimates for cancer risk in association with all of those activities that I have just indicated range in the order of 1, roughly per billion, they are in the order of 1 times 10 to the -10 to 1 times 10 to the -11 which is -- it's roughly 1 per billion. It is actually a little less than that, and that's the worst case.

If we were actually to look at the typical case, one would reduce the risk by at least two orders of magnitude; that is, it would become approximately 1 in 100-billion.

If you were to sum these risks, if you like, if we presumed - and Dr. Crump hasn't done that - but we could presume, if you like, for the sake of discussion that one would be exposed to the herbicide dermally, drink water contaminated with it, eat meat and so on and so forth.

If you were to sum all of these risks - and I've just done that very quickly in my own head - it comes out to be approximately 1 in a 100-million, and that's assuming that ingestion of all of these sources were always contaminated with picloram and always at the worst levels which were contemplated in this document.

So to answer your question, should a hunter who may be eating some wild game which is contaminated with picloram be concerned, I think the short answer to your question is no.

Q. That's fine. Does picloram cause -- sorry, one page too soon. The article which is now Exhibit 743, I am just going to be paraphrasing what appears at 1301, the beginning of page 1301 under the introduction section and the end of the article on page 1304.

Just paraphrasing it, Newell indicates that:

"The prevailing rates of small intestinal adenocarcinoma among humans in New Zealand are among the highest in the world and New Zealand is a heavy user of phenoxy and picolinic acid herbicides."

Now, the authors state that this suggests

that further studies are warranted in this area for both animals and humans and, I take it, Dr. Ritter, your answer is still no?

A. I'm sorry, could you repeat the last part of your question for me?

Q. The authors state in the last paragraph of Exhibit 743 that:

"This suggests that further studies are warranted in this area for both animals and humans."

Do you agree or disagree in the context of Canada?

A. I would disagree.

Q. Can I ask you, is that based exclusively on the Crump article?

A. No, not at all.

Q. Well, what else do you base that on?

A. I base it on intensive investigations that have been done of cancers of the intestinal tract world-wide, and the example that I would cite for you is the analogy that's often drawn between breast cancer and cancer of the intestinal tract both in developed, undeveloped and in various regions across the world.

We know that the single largest factor driving the incidence of intestinal cancer in man is

diet, but rather than sheep versus cows versus pigs, we know that it is driven to a large extent by the component of dietary fiber in the diet.

To put that into some real life terms for you, we know that breast cancer which is the No. 1 killer among North American women, strikes approximately 1 in 4 women, is virtually an unknown disease in the Orient. Converse of that is whereas intestinal cancer is relatively high in North America --

THE CHAIRMAN: Can you slow down a little bit, please.

DR. RITTER: The converse to that is whereas intestinal cancer is known to occur with much greater frequency in the Orient than it is in North America, and we also know that if we take an Oriental women and transplant her to a North American culture and the converse, we can actually reverse the risks of those cancers.

Those observations have led many oncologists and epidemiologists, including the National Cancer Institute of Canada, to conclude that the extent of dietary fat and saturated fiber in the diet of Canadians, indeed in the diet of humans, is a very important component in the etiology of intestinal and

breast cancer.

In all likelihood, it's probably the -- those factors are probably the single most important components in the incidence of that disease.

So I would not disagree with the authors that intestinal cancer merits further investigation. I would most certainly disagree with the authors that on the basis of this kind of an observation this suggests that the association between picloram and the incidence of intestinal cancer in sheep suggests that man may be at risk. I would certainly disagree with that conclusion.

MR. CASTRILLI: Q. I am just wondering, Dr. Ritter, if you could provide me with any references for the comments you've made?

You don't need to do that now, obviously, but at any time before the end of your testimony, references.

A. You would like references on the role of dietary fiber?

Q. Well, whatever you rely upon to disagree with Newell that you just set out.

A. Sure. That's no difficulty, I can provide that.

Q. That's fine, thank you.

A. I would in fact give you one reference right now. You may be interested in consulting the Atlas of Mortality, Morbidity for Canada, as well as the Atlas of Mortality and Morbidity published by the World Health Organization, International Agency for Research on Cancer.

Those two atlases will provide you with the demographics of the two diseases to which I was referring. An examination of those charts I think will refer to you that the incidence for breast cancer and intestinal tract cancer, particularly cancer of the stomach, are exactly reversed among Oriental and North American cultures.

That's a rather lengthy volume. Other than giving you that reference, I would prefer not to physically make it available here.

Q. No, no, I'm not asking you to do that. If you could just provide me with a list of references, these and others, I would be content with that.

Now, Dr. Ritter, while we are still on the subject of picloram, can you confirm for me that in the United States, picloram is contaminated with two carcinogens, hexachlorobenzene and nitrosamines?

A. I can't confirm for you what is

contained in the U.S. source of picloram, no.

Q. Let's look again at Exhibit 742, the guidance document.

A. Yes. The document which you provided indicates that picloram is contaminated with the two contaminants to which you refer, but you are asking me to confirm that that's true. I can't do that.

Q. Well, no, let's just do it this way. Is it contaminated with hexachlorobenzene and nitrosamines in Canada?

A. Yes, it may be.

Q. Thank you. What may be different is the -- well, let me just refer you to page 5. We'll do this one step at a time. That is under the heading of history.

A. Yes.

Q. Paragraph 2 the United States EPA outlines that hexachlorobenzene may be a contaminant of picloram up to 200 parts per million and for nitrosamines picloram may be contaminated up to 1 part per million.

Can I take it that you do not know what the comparable numbers would be in Canada?

A. I would presume that they would probably be similar to the ones that have been

indicated here.

Q. Fine, thank you. And hexachlorobenzene is a probable cancer -- sorry, excuse me, probable carcinogen?

A. At sufficient dose, yes.

Q. And nitrosamines are carcinogenic as well?

A. Generally speaking, yes.

Q. Dr. Ritter, I have referred you to a massive pile of documents I believe, an excerpt from a report done by the United States Environmental Protection Agency on their bio-accumulation study for 1985. Do you have that before you?

A. I wonder if you can just identify that for me a little more precisely?

Q. It would be an excerpt. That is what it looks like.

MR. CASTRILLI: Mr. Chairman, this is an excerpt that I will be asking be made the next exhibit. I provided my friend, Ms. Murphy, with the Table of Contents which I actually did not provide to her last day, I gave that to her yesterday and, to my knowledge, the only parts of the report that are relevant in terms of the discussion I wish to have with Dr. Ritter on the issue of hexachlorobenzene are in fact the three pages

I gave him last week.

Q. Dr. Ritter, do you have that now?

DR. RITTER: A. Yes, I do.

THE CHAIRMAN: All right. The excerpt will be Exhibit 744.

---EXHIBIT NO. 744: Excerpt of U.S. EPA report on bio-accumulation, 1985.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

MS. MURPHY: I just had a discussion with my friend. As he advises, he provided me yesterday with -- I asked him to provide me with the entire document, he provided me with what he has, which is just the Table of Contents.

I would like to note for the record, and I don't imagine you have a Table of Contents, but it appears on its face that the section that deals with hexachlorobenzene starts on page 41 and goes to at least page 44, if not page 45, and I want to have it noted on the record that the entire section is not attached in this exhibit.

MR. CASTRILLI: Mr. Chairman, just so that you are clear on my position. The discussion on hexachlorobenzene ends before the end of page 43, and other products are then discussed.

MS. MURPHY: Just so that we are clear, this section doesn't continue to discuss hexachlorobenzene, but Mr. Castrilli is advising that the rest of it deals with products other than picloram.

MR. CASTRILLI: That's my understanding, Mr. Chairman, and I will endeavor to determine if there is anything else. I just don't have the entire study and never have.

I think for the purposes of this discussion I'm going to have with Dr. Ritter it's not material, but I certainly will undertake to try and get the entire report. I don't have it.

Q. Dr. Ritter, just referring you to what is now Exhibit 7 -- page 41 of Exhibit 744, the second paragraph.

DR. RITTER: A. Yes.

Q. The authors of the document indicate that:

"HCB.."

Which I take it, Dr. Ritter, is the acronym for hexachlorobenzene?

A. That's correct.

Q. "...poses human health and environmental risks very similar to those posed by other fat soluble toxicants such

as DDT and PCBs."

Do you agree with that assessment?

A. To the extent that DDT was considered to pose human health risks -- see, to try to answer your question, Mr. Castrilli, again I have to -- the difficulty I have is that what we are looking at here is three pages of a document, the total length of which I'm actually unfamiliar with.

It's very difficult for me to try to answer your question in any sort of an intelligent way without being able to put the context of these three pages into their proper terms of reference; that is, into the fullness of the entire document.

For all I know the pages that preceded this one may have said that DDT was not considered to pose a significant health risk at all, and then this sentence would then go on to say that poses similar risks to DDT. Now, if DDT didn't pose one, neither does this.

So I will answer your question rather than delay things by saying, to the extent that DDT may pose health risks, that is what the sentence says, yes, but the sentence makes no statement as to the health risks posed by DDT or PCBs.

MR. CASTRILLI: Okay.. Mr. Chairman, I

will at a break or perhaps tomorrow provide the Board with a copy of the Table of Contents and I would ask that it be made part of Exhibit 744.

THE CHAIRMAN: That will answer, Dr. Ritter's concern.

MR. CASTRILLI: No, I recognize that, but it may help at least begin to set the context for this discussion.

Q. Dr. Ritter, you prefaced your comments by focussing on DDT. What about PCBs? Does hexachlorobenzene pose human and environmental health risks very similar to those posed by other fat soluble toxicants such as PCBs?

DR. RITTER: A. I would imagine it would be similar.

Q. Thank you. Would it be fair to conclude that if HCB is accumulating in humans, it would accumulate in animals as well, wild animals?

A. You are referring to wild animals, animals in the wild?

Q. Yes.

A. I don't know if that would be fair to conclude or not. As I reminded you, Mr. Castrilli, when I appeared here I appeared here in an attempt to offer some expertise with regards to human health and

safety. I'm really not prepared to draw conclusions as to what this implies for animals in the wild.

Q. Okay, let's continue to focus then on humans. The paragraph goes on to state:

"Studies during the past 10 years have indicated that while the concentrations of DDT and PCBs in human adipose tissue in the United States have been decreasing, the level of HCB has remained the same or possibly increased."

And then it notes:

"In a U.S. EPA human tissue monitoring study, 98 per cent of human fat samples had HCB at measurable levels, 50 parts per billion to 100 parts per billion."

Can you advise the Board what the situation is with respect to HCB in Canada?

A. I cannot at this time, no.

Q. Has Canada done any monitoring study on human tissue?

A. I do not know.

Q. Is that something that National Health and Welfare would be the agency to do, if one did exist?

A. Not necessarily. It may have been

done by a provincial health agency. Typically these samples are obtained from autopsy and require concessions of both participating hospitals and next of kin. So that the ability to do these kinds of studies is not always there. I don't know if such a study has been done in Canada or not.

Q. Could I ask you just in relation to Health and Welfare Canada to make the appropriate inquiries and advise the Board as to whether such a study has been done in Canada?

A. Yes.

Q. And, Dr. Ritter, just as a general principle -- or keeping it at a general level, do you agree that every effort should be made to keep HCB out of the environment?

A. Yes. I would just put in the word, every reasonable effort should be made to keep HCB out of the environment.

Q. Amendment so noted. Dr. Ritter, just returning you again to Exhibit 742 which is the reregistration document on picloram.

A. Yes.

Q. I refer you to page --

MS. MURPHY: I thought we weren't going to deal with that until we had an opportunity to look

at the document.

MR. CASTRILLI: These pages are the pages he would have had since last week. As you noted before, they include pages 9 and 10.

MS. MURPHY: I think as was noted before it's difficult to draw conclusions from those single pages, given that the entire document deals with various other matters that are reflected on.

MR. CASTRILLI: The only pages dealing with oncogenicity are pages 9 and 10 and he's had them since at least last Friday.

THE CHAIRMAN: Okay. Dr. Ritter, let's hear Mr. Castrilli's question. If you have difficulty with these questions because you would like to read the entire document, we will give you that opportunity.

MR. CASTRILLI: Q. Can you confirm for me, Dr. Ritter, that the United States does not have acceptable chronic rodent oncogenicity studies for picloram?

MS. MURPHY: Are you referring to some words that are on this --

MR. CASTRILLI: Focussing on page 10, the last three pararaphs before the heading: Teratogenicity. Reading those three pararaphs together.

DR. RITTER: Your question was as to the adequacy of long-term studies?

MR. CASTRILLI: Q. Does the U.S. EPA have adequate chronic rodent oncogenicity studies on picloram?

DR. RITTER: A. No, I don't think so, not on the basis of the pararaphs you have highlighted here.

MR. CASTRILLI: All right. Perhaps, Mr. Chairman, to be fair to Dr. Ritter, I would like to have his full answer on this and I'm content to have him review the document overnight and we can pick this up tomorrow.

Q. Dr. Ritter, can you confirm for me that at least one U.S. National Cancer Institute pathologist reviewing all known carcinogenicity studies on picloram to 1981 concluded that picloram is carcinogenic in rats and mice?

A. No, actually I can't confirm that, Mr. Castrilli. You are referring to a report I believe by Melvin Dwayne Ruber published in the Journal of Toxicology and Environmental Health in 1981 which you provided to me in the latter part of last week.

I think that's the study you're referring to when you asked me to confirm the carcinogenicity of

picloram?

Q. Yes.

A. No, I can't confirm that. And I will have to elaborate, Mr. Chairman, as to why.

Q. Mr. Chairman, before he does that, I think we better make it an exhibit.

THE CHAIRMAN: Exhibit --

MS. MURPHY: Well, before he does that, and I note this document my friend is intending to make an exhibit, I would like to ensure that it is a complete exhibit and I have another page that should be added to it.

MS. CRONK: Mr. Chairman, could I just rise on a related point?

I spoke to my friend Mr. Castrilli over the break because, as is self-evident, we've had a very large amount of paper marked in the last evening and today, articles.

I hasten to say that others, including myself, in the course of cross-examination have abused the rules and you've asked us not to do likeways, but not in the volume and degree that we have seen in the last day and a half.

I do not have copies, nor have I been provided by Mr. Castrilli in advance of copies of many

of these documents. I say that not with any criticism but, as a functional matter, it's very difficult for me to seek the advice of my clients' experts on these documents when I receive them as the evidence is elicited.

I can't make any submissions to you, even were they to be appropriate regarding the admissibility, of this wealth of paper as put in in this way.

I don't rise to object to the future course of doing that, but I did speak to my friend at the break because I would like to have a copy of those remaining documents, of which he said they were a large number, that he intends to put in this way.

I can't respond at all to the kind of dialogue that is occurring between Ms. Murphy and Mr. Castrilli as to whether the document is in fact complete or appropriate when I have never seen it.

So I say it without - recognizing it's a problem for all of us - but this I think is an unusual category because they are all scientific articles, a very large number, a very short period of time and, in fact, the style of cross-examination is such that the witness is being asked to confirm a statement of fact or a factual situation very often without reference to

the document itself, and that makes it impossible for those of us here who know some of the literature in the area to know which study we are even getting into.

THE CHAIRMAN: Well, Mr. Castrilli, obviously you know the documents that you are going to be seeking to admit over the next day and rather than distributing them to your colleagues piece meal as they come in, would it be possible for you to at least distribute those that you will be seeking admission for today, so that they have them overnight.

MR. CASTRILLI: Mr. Chairman, I'm content to do that. Ms. Cronk and I did discuss this at the luncheon break. There just wasn't time for me to do it in light of other matters I had to attend to.

I would note that I was confronted with the same problem, although not in the wealth of numbers in terms of articles, when Ms. Cronk filed her material during the course of her cross-examination.

As I indicated, I'm certainly content to make it available, but I would note I was under the same constraints during her cross-examination.

THE CHAIRMAN: Okay. Well, as Ms. Cronk noted, it's been a matter that I think all parties have had to labour under and probably will throughout the course of the hearing.

But wherever possible, where counsel know in advance that they are going to be seeking admission for certain documents, they should be distributed to all other counsel as early as possible.

In some cases it is just not possible to do it except on the day of the testimony, but in most cases it should be able -- there should be an opportunity at least at the commencement of the week to distribute some of these documents so that we aren't faced with this problem.

Because it is a problem for counsel and their expert witnesses to follow along, particularly if there is going to be a question as to a document's admissibility.

MR. CASTRILLI: Okay.

THE CHAIRMAN: So having said that --

MS. MURPHY: Having said that, where we were was that Mr. Castrilli was about to enter a document written by Melvin Ruber and I rose to advise that I think there is another page that should be appended.

I will provide this -- all I have, however, is one faxed copy of the page. I will have to copy it for you.

But my friend had begun his questioning

by asking whether a representative of the National Cancer Institute had come to certain conclusions and, that being the case, I would like to ensure that the record shows that there was subsequently an erratum published after this particular document was published which indicates that this particular article was reported as independent studies performed by the author on personal time.

This work has no endorsement from either the National Cancer Institute or Litton Bionetics which was published in this Journal in the subsequent publication, and that the two pages should be put together.

MR. CASTRILLI: I have no difficulty with the addition of the erratum.

DR. RITTER: Mr. Chairman --

MR. CASTRILLI: If Ms. Murphy can tell me what year it came out.

MS. MURPHY: It came out in the following -- 1981, in the following edition, the May '81 addition of that Journal.

MR. CASTRILLI: I have no difficutly with that, in that if she would like to make the extra pages.

DR. RITTER: Mr. Chairman, if I may,

that's a very important omission and I'm just going to take a moment to elaborate on that.

The reason why that's a very important --

THE CHAIRMAN: Well, just a moment. Let's get the document distributed in the first place.

Ms. Murphy, I think it is almost time for the afternoon break. Why don't we take the break at this time, you can perhaps get that page reproduced during the break, and then we can admit the whole document immediately upon coming back.

MS. MURPHY: That's fine.

THE CHAIRMAN: We will break for 20 minutes.

Thank you.

---Recess taken at 3:20 p.m.

---On resuming at 3:50 p.m.

THE CHAIRMAN: Thank you. Be seated, please.

MR. CASTRILLI: Mr. Chairman, I believe we had left off with I was about to file the Ruber article and Ms. Murphy was about to file some sort of disclaimer which appeared in a subsequent edition of the --

THE CHAIRMAN: Are they going to come in as the same number?

MR. CASTRILLI: They should come in as the same document.

THE CHAIRMAN: All right. Exhibit 745. Does anyone have a stapler there? Would you mind putting it on the Board's copies, please, so it doesn't get mixed up in this pile.

MR. CASTRILLI: (handed) What I have done is stapled the errata sheet as the last page.

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 745: Article written by Melvin Ruber, dated 1981, along with an errata sheet.

THE CHAIRMAN: The staple fell out of this copy, Mr. Castrilli.

MR. CASTRILLI: It says something for the value of the errata, I guess. Do you have the stapler?

MS. BLASTORAH: (handed)

MR. KINGSBURY: What's the number?

MR. CASTRILLI: 745.

MRS. KOVEN: Is the date of this 1981, the article?

MR. CASTRILLI: The date of the article is 1981.

MS. MURPHY: The errata is May, 1981. It is the same Journal.

MR. CASTRILLI: But not the same edition?

MS. MURPHY: No.

MS. CASTRILLI: It didn't come out at the same time.

Q. Now, Dr. Ritter, the Ruber article -- sorry, let me begin by: Dr. Ruber is a pathologist, to your knowledge; is that right?

DR. RITTER: A. Yes, that's correct.

Q. And at the time he was employed by the National Cancer Institute?

A. That's correct. The Frederick Cancer Research Centre of the U.S. National Cancer Institute.

Q. Now, in this study or this review, I understand that Dr. Ruber examined two studies of the carcinogenicity of picloram in animals?

A. That's correct. In fact, I think there may have been three in part that were examined in Dr. Ruber's investigation.

Q. Now, can you confirm for me that he reviewed, in fact, all the known carcinogenicity studies on picloram to that time and concluded that picloram is carcinogenic in rats and mice?

A. Well, Mr. Castrilli, I can't confirm that because there is actually information which you may not have had which suggests quite the contrary.

There was an article which appeared in

Pesticide and Toxic Chemical News on April the 15th, 1981, at about the time that the erratum was issued to this paper and the significance of the erratum - I don't want to overstate it - but in submitting this original manuscript to the Journal of Toxicology and Environmental Health, as an employee of the United States National Cancer Institute, this paper would have considerable stature within the scientific community.

The distance which the U.S. National Cancer Institute created between itself and the author in the subsequent erratum is significant not only for its face value but because the National Cancer Institute has a very strict policy of internal peer review prior to publication, and this paper and this work was not subjected to that peer review.

Q. Just stopping there, Dr. Ritter. Is the Journal of Toxicology and Environmental Health a peer reviewed journal?

A. Yes, it is, but the referees of the journal could not have established if this work had actually taken place. They would have accepted on face value that if the author reported that he did these investigations he indeed did them.

It is for that purpose, if I may, I would like to just briefly highlight the events which were

reported in this April 15th, 1981 publication to which I referred. It says:

> "Dr. Melvin Ruber, pathologist, gets sharp censure and warning from his supervisor..."

And I am going to paraphrase this a little bit in the interest of brevity, but I can make its full text available to the Board.

Q. Dr. Ritter, before you start, what is it you are reading from?

A. I am reading from April 15th, 1981, Pesticide and Toxic Chemical News. The date is noteworthy, as will the identification of the chemicals become in a moment, because it was issued at about the same point in time as his paper appeared and as the erratum appeared. And it says:

> Dr. Melvin D. Ruber, a pathologist repeatedly involved with pesticide carcinogenicity studies and interpretation of study results and slides, has been censured by his supervisor for general unprofessional conduct and charged with specific obstreperous actions which have had a multi-million dollar implication giving

the impression that the National Cancer Institute may be administering programs of questionable competency.

The competency issue, as I'm sure you can appreciate, Mr. Castrilli, comes in because the results which Dr. Ruber reports contrast rather sharply what the observations which the National Cancer Institute reported on those very same studies. The censure goes on to say:

> The allegations which have been brought against you, which I have investigated and have found to be true, are that you have reinterpreted slides that were part of several bioassay carcinogenicity tests including those tests associated with malathion, maloxam and picloram.

And then it goes on and on and on.

> Therefore, I can only assume that your statement regarding your thorough evaluation of these slides was inaccurate and misleading.

And, again, I'm just going to go almost to the end. This is just about two pages long, but I am going to go almost directly to the end.

> I find this to be the most flagrant

professional abuse that I have ever experienced in my scientific and administrative career.

This is Dr. Hanna in his correspondence with Dr. Ruber:

You have violated a signed employment agreement that you had with the Frederick Cancer Research Centre when you joined the staff acknowledging that you would adhere to the publication policies as well as all other policies. Your blatant disregard for these agreements is grounds for immediate termination. I will not use this administrative prerogative, however, because due to the sensitivity of the issues your termination could be easily misinterpreted. Furthermore, all publications that you are associated with are to adhere to the rigid policy of internal scientific review and clearance through my office and through the National Cancer Institute administrative Offices.

And I will stop there.

The point of this censure, Mr.

Castrilli -- and much of this censure refers specifically to malathion and maloxam, although picloram is named specifically by Dr. Hanna.

The point that I'm trying to make here is that I think it would be improper for me to confirm for you the conclusions which Dr. Ruber reached when, in fact, his supervisor has already challenged the validity of those very conclusions on the very study to which you refer.

Q. Dr. Ritter, let me just ask you about the status of this article that is now Exhibit 745.

It seems to me that what you have filed or what was provided by your counsel was an erratum sheet to the exhibit which simply indicates that Dr. Ruber was reported as independent studies performed by author on personal time, that the work has no endorsement from either the National Cancer Institute or Litton Bionetics.

Who are Litton Bionetics?

A. Litton Bionetics was one of the contract laboratories utilized by the National Cancer Institute to conduct many of the cancer bioassays on behalf of the institute.

Q. All right. So the sum and substance then of the retraction of this article constitutes that

erratum, to your knowledge?

A. No, this is not a question of a retraction.

Q. Well, what's the status of this article within the Journal of Toxicology and Environmental Health?

A. To the best of my knowledge, as I indicated to you, the article itself stands because the referees of the article have no alternative but to accept on face value that if an investigator says he has made a series of observations they simply do not have the ability to question whether or not those observations have actually been made.

But what I'm suggesting to you is that his supervisor does and can question the validity of those observations and, in this particular case, has and has concluded that it's unlikely that these investigations were actually carried out as Dr. Ruber claims in this article that he did.

Q. Now, is that in relation to picloram or in relation to these other pesticides?

A. It's in relation to all three. Some of the parts that I read to you refer specifically to two, but the censure relates to three and, as a matter of record, I will say:

You have reinterpreted slides that were part of several carcinogenicity assays, including those tests associated with malothion, maloxam and picloram.

With regard to malothion and maloxam, your statement in a letter to Mr. Rominger, the Director of the Department of Food and Agriculture in Sacramento, California..."

And so on and so forth. At the end of the article it refers to the three chemicals in question.

I think what I'm trying to answer you, Mr. Castrilli, is that I am not prepared to confirm for you today that there is any validity to the statements made in the journal article that you refer to because Dr. Hanna, in my view, has already cast very serious doubt about the validity of those re-examinations.

THE CHAIRMAN: Dr. Ritter, that censure document you have just read parts from, that I take it is a public document?

DR. RITTER: Yes, it is.

THE CHAIRMAN: And, to your knowledge, has there been any further comeback from Dr. Ruber with respect to that article; in other words, are you aware

of any litigation involving that accusation?

DR. RITTER: None that I'm aware of.

THE CHAIRMAN: And do you feel that -- well, do you have any views as to what the scientific community feels vis-a-vis this article?

DR. RITTER: What I'm offering is personal conjecture, that Dr. Ruber historically has been associated -- his career has, from time to time, been marked with significant controversy regarding the reinterpretation of pesticide studies and often his reinterpretation has been at odds with the original interpretation rendered by either the sponsoring agency or the sponsoring laboratory.

Particularly within that context, I found Dr. Hanna's censure to be noteworthy because it was within the realm of possibility, given some of the events that had been associated with Dr. Ruber's career.

It is a very, very serious censure for the Director of the National Cancer Institute for the Director of the Federal Cancer Centre to, after a fashion, suggest that one of his pathologists was lying.

THE CHAIRMAN: Well, the reason I'm asking these questions is, is because of the nature of

the accusation, one would expect if Dr. Ruber didn't agree with Dr. Hanna's views that further action would ensue. It is, after all, his representation which is at stake.

DR. RITTER: Yes, it is.

THE CHAIRMAN: And you aren't aware of any further proceedings resulting from that censure being published?

DR. RITTER: None whatsoever. Quite the contrary, until quite recently Dr. -- he may still be employed by the Frederick Cancer Research Centre, although I can't confirm as of today - but certainly within recent history he has been on staff at the Frederick Cancer Research Centre.

Although I must say that his publication activity has been somewhat abbreviated since this round of incidents took place in 1981 and 1982.

THE CHAIRMAN: Okay.

MR. CASTRILLI: Mr. Chairman, we obviously can't take this any further. I don't know whether there has been any litigation in relation to Dr. Ruber and whatever allegations.

I presume we are going to make that an exhibit.

THE CHAIRMAN: Yes, I think we should

mark that document as well. Exhibit 746.

MS. BLASTORAH: Mr. Chairman, if I may perhaps. We will have copies made.

THE CHAIRMAN: Okay. could we just have the sort of title for that?

MS. BLASTORAH: Yes. The title of the article or the journal rather is in the Journal of --

DR. RITTER: It's a trade, it's an association trade type of publication - how shall I describe it - it's a publication which is put out in Washington of general interest to people involved in pesticide regulation.

MR. CASTRILLI: I think it's a Newsletter actually.

MS. BLASTORAH: The title is Newsletter then. It's Pesticide and Toxic Chemical News dated April 15, 1981 and at pages 22 and 23 is an article entitled: Dr. Mel Ruber, Pathologist, Gets Sharp Censure, Warning from the Supervisor.

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 746: Newsletter entitled: Pesticide and Toxic Chemical News dated April 15, 1981 with an article entitled: Dr. Mel Ruber, Pathologist, Gets Sharp Censure, Warning from the Supervisor at pages 22 and 23.

DR. RITTER: What is particularly --

perhaps not particularly, but what is noteworthy, Mr. Castrilli, about Dr. Hanna's observations in that article which we just read is that the conclusions which Dr. Ruber reached in his publication contrast very sharply with the conclusions which the National Cancer Institute and which the Environmental Protection Agency reached on those very same studies.

If you were to take a look, for example, at the review -- the abbreviated review of those cancer studies in the picloram guidance document, which you made available, you will note that none of the effects which Dr. Ruber described in his publication have been noted in the picloram registration standard.

MR. CASTRILLI: Q. Dr. Ritter, we are going to deal with what is now Exhibit 742 tomorrow; is that right?

DR. RITTER: A. Yes. I'm just referring to a specific paragraph on -- in the context of this controversy, if you like. I'm simply trying to point out that the review to which I'm referring is on page -- beginning on page 8 and continuing on page 9 and 10 and you may wish this evening, for example, if one were to review the conclusions reached from those very same carcinogenicity studies, it's important to note that these studies are the same studies referenced

in the registration standards and in Dr. Ruber's investigation.

There is really no similarity between the two sets of conclusions whatsoever in fact, to be quite frank, on first examination I was surprised to find that they were actually describing the same studies because there isn't any commonality between the two sets of conclusions at all. It's as if they are entirely different investigations.

Q. Dr. Ritter, I understand you now have the entire of Exhibit 742 and we can discuss this tomorrow?

A. Yes. You might also wish to note, Mr. Castrilli, in reviewing this document tomorrow that the date on the guidance document is 1988, almost two and a half years after Dr. Ruber's publication first appeared in the Journal of Toxicology and Environmental Health.

So I would expect that the agency would have had ample time to have included any review of Dr. Ruber's work that they felt appropriate and would have included any conclusions thereof.

Q. That's fine. We will deal with that as well tomorrow.

Now, I understand that MNR's position and

your evidence, Mr. Kingsbury, that the herbicides principally used in timber management when applied at approved rates do not bio-accumulate to toxic levels in wildlife; is that correct?

MR. KINGSBURY: A. That's correct.

Q. And that the low persistence of herbicides, the high tolerance of animals to them, and their rapid rate of excretion prevents such problems; is that right?

A. Yes.

Q. That is essentially the conclusion to be found in Exhibit 4 at page 90. Exhibit 4 is the Environmental Assessment Document.

A. Would you like me to have that in front of me, Mr. Castrilli, or...

Q. You might just have that in front of you.

A. That was page 90, is that right?

Q. Yes, lines 18 to 22. And you agree with those four lines; is that right, five lines.

A. That's correct.

Q. And I understand from the ESSA document that your testimony is that 2,4-D in particular does not bio-concentrate or bio-magnify in animals; is that right.

A. 2,4-D?

Q. Yes?

A. In particular?

Q. Yes.

A. That's correct.

Q. Dr. Ritter, can you confirm for me that 2,4-D can be contaminated with various dioxins and furans?

DR. RITTER: A. Yes and no. Dioxin is a generic term which refers to a family of as many as 90 possible contaminants.

2,4-D sold in Canada has never been known to be contaminated with the most significant member of that class, so I hesitate to answer your question as yes because I may impart the wrong impression.

It has been contaminated from time to time with members of the class of dioxins which are considered to be biologically relatively unimportant and has never been contaminated ever, for any product commercially available in Canada, with the dioxin normally associated with very potent biological activity.

So it's a yes/no answer.

MRS. KOVEN: Excuse me. Why would that be the case in the United States and not in Canada?

MRS. KOVEN: Excuse me. Why would that be the case in the United States and not in Canada?

DR. RITTER: I don't think it's the case in the United States.

TCDD, tetrachlorodibenzo-dioxin, one often uses the generic term dioxin to refer to 2,3,7,8-TCDD and it's important for those perhaps who are less familiar with that literature to draw that distinction because they are very distinct issues.

2,3,7,8-TCDD is the chemical which I'm sure as you see in the popular press and the Globe and otherwise, has been referred to as the most potent carcinogen ever developed by man, and so on and so forth.

2,3,7,8 has never been detected in any sample commercially available in Canada and that has recently been confirmed by laboratory analyses done, I should add, with state-of-the-art equipment through the Laboratory Services Division of Agriculture Canada.

MRS. KOVEN: So the experiences you were talking about were international experiences?

DR. RITTER: I'm sorry, which experiences?

MRS. KOVEN: What were you referring to by contamination of any of the dioxin products?

but...

MRS. KOVEN: In Canada?

DR. RITTER: In Canada.

MRS. KOVEN: But not the toxic isomer that --

DR. RITTER: But not those components that are normally associated with the potent biological activity and I felt the need to introduce the clarification, because if I simply said, yes, dioxins may be present in 2,4-D, I think for many that will immediately conjure up the impression that 2,3,7,8 is in 2,4-D and that is incorrect, it has never been detected in any Canadian source.

MRS. KOVEN: Could you answer for me just quickly: Is there -- what are the differences in the product between Canada and the United States - typically we use the same product that is used in the United States - if you were talking about Roundup?

DR. RITTER: Yes. You are referring to active ingredient when you say product.

The final formulated product is often different between Canada and the United States, in fact it may be different from one geographic region of Canada to another.

MRS. KOVEN: Because of the distribution

by the manufacturer?

DR. RITTER: Primarily because of the mode of action, the formulation is often created to serve a particular market need and that will often determine the solvents and various emulsifiers that may be used in a particular formulation.

For example, in the home and garden market 2,4-D formulations which are in a granular form are quite popular, whereas in forestry settings or in agriculture, these kinds of formulations are very unpoplar.

But the product itself, because there are essentially no primary manufacturing sources for active ingredients in Canada, are almost always derived from the United States or offshore, but almost never developed in Canada.

MR. CASTRILLI: Q. Dr. Ritter, can you confirm for me that in 1980 researchers at Agricultural Canada analysed samples of 2,4-D for dioxins and detected the TCDD isomer 1,3,6,8?

DR. RITTER: A. Can you tell me the report from which you are reading, Mr. Castrilli?

Q. Cochrane, Analysis of Technical and Formulated Products of 2,4-D for the Presence of chlorinated dibenzo-para-dioxins; Cochrane and others,

Formulated Products of 2,4-D for the Presence of chlorinated dibenzo-para-dioxins; Cochrane and others, 1980?

A. Yes, I'm familiar with the study that you are quoting from. I'm trying to locate it. Yes, I'm familiar with that study.

MR. CASTRILLI: Mr. Chairman, can I ask this be made the next exhibit.

THE CHAIRMAN: Very well. Exhibit 747.

---EXHIBIT NO. 747: Article entitled: Analysis of Technical and Formulated Products of 2,4-D for the Presence of chlorinated dibenzo-para-dioxins; Cochrane, et al, 1980.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Dr. Ritter, are not dioxins found -- are some forms of them found naturally--

DR. RITTER: Yes, quite naturally.

THE CHAIRMAN: --in the environment and are some of them a result of combustion such as forest fires--

DR. RITTER: Yes.

THE CHAIRMAN: --lightening strikes and that kind of thing or believed to be a result of that?

DR. RITTER: Yes, yes.

THE CHAIRMAN: Is the dioxin in that form

the lethal one 2,3,7,8 -- is it the one that you mentioned previously 2,3,7,8?

Is the dioxin that is found naturally in the environment of that type?

DR. RITTER: Yes. 2,3,7,8 -- it's difficult to answer your question very precisely because that is at the heart of much of the controversy as to how much occurs quite naturally on its own and how much have we contributed to the overall environment of burden.

I don't want to lead you astray with my own biases by suggesting that the natural occurrence of it is far greater than the industrial contribution, but there is no question that there is some natural contribution. We could perhaps argue as to the extent, but that it occurs in nature is, I think, beyond question.

THE CHAIRMAN: And of that contribution by nature, is it this particular one, 2,3,7,8; is that amongst the ones produced by nature?

DR. RITTER: Yes, it is.

THE CHAIRMAN: It is. Thank you.

MR. MARTEL: Not in Canada though?

DR. RITTER: I'm sorry.

MR. MARTEL: You said 2,3,7,8 wasn't

found in Canada, I think you said in commercial products.

DR. RITTER: In any commercial sample of 2,4-D ever analysed, that's right.

MR. MARTEL: But not the other though.

DR. RITTER: I'm sorry?

MR. MARTEL: We have the one produced naturally here; is that it?

DR. RITTER: That's right.

MR. CASTRILLI: Mr. Chairman, attached to what is now Exhibit 747 is a Press Release that was issued by Agriculture Canada on Dr. Cochrane's tests in October, 1980. I just added it to the end of the text

Q. Dr. Ritter, just reading from the abstract, Dr. Cochrane's paper states in part:

"16 samples of 2,4-D ester and amine both technical and formulated products representing current..."

And by current he means 1980:

"...Canadian supplies were analysed for the presence of different chlorinated dibenzo-para-dioxins."

Just skipping down several lines:

"Dioxin identity was confirmed using high resolution mass spectrometry. In 8 out

of 9 esters and 4 out of 7 amine samples were found to contain di-, tri- and tetrachlorodibenzo-para-dioxins. Ester formulations showed significantly higher levels of contamination than the amine formulations and the tetrachlorodioxin observed was the 1,3,6,8 isomer."

Do you agree with that in your experience?

A. Do I agree that Dr. Cochrane has found this?

Q. No, do you agree that, in your experience, in evaluating studies with respect to 2,4-D that those contaminants -- Put it this way, let me put it this way: Were you aware of these findings made in 1980?

A. Oh yes.

Q. And would you agree with me that the regulatory and health concern with respect to the potential for dioxin and furan contamination of 2,4-D continues today?

A. That the concern?

Q. Yes?

A. Yes. There is an ongoing monitoring

program for commercial 2,4-D products in Canada, in fact, for a variety of products for which there exists the chemical potential for contamination with these contaminants?

Q. Dr. Ritter, you are also familiar with the registration or reregistration document on 2,4-D?

A. Yes, I am.

Q. It's a publication of the U.S. Environmental Protection Agency, September, 1988?

A. That's correct.

Q. And you have a copy of the excerpts, therefore?

A. Yes, I do.

MR. CASTRILLI: Mr. Chairman, I ask that this be made the next exhibit.

THE CHAIRMAN: Exhibit 748.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 748: Excerpts from U.S. EPA document entitled: Guidance for the Reregistration of Pesticide Products Containing 2,4-dichloro-phenoxyacetic acid (2,4-D) as the Active Ingredient, September, 1988.

THE CHAIRMAN: We don't think, Mr. Castrilli, you are assisting the Ministry in any

meaningful way. We are approaching a thousand. Our guess is they will get stuck.

MR. CASTRILLI: Q. Now, Dr. Ritter, referring you to Exhibit 748 --

MR. CASTRILLI: And, Mr. Chairman, I have noted that these are again excerpts.

Q. You are familiar with this document generally in your capacity as Chief of Pesticides Division at Health Protection Branch?

DR. RITTER: A. I am.

Q. I refer you to page 29. It would be item 19 at the bottom of the page, notes that the United States:

"EPA is requiring analytical chemistry data for 2,4-D products to evaluate contamination with tetra through heptahalogenated dibenzo-p-dioxins or dibenzofurans or N-nitrosamines."

You are aware of this; is that right?

A. Yes.

Q. Is Canada also requiring tis information?

A. In fact, as I indicated to you, Canada has had an ongoing monitoring program for a broad range of chlorinated contaminants in a variety of

phenoxy products including 2,4-D but not restricted to it.

Q. And is there a periodic or ongoing report regarding the contamination of 2,4-D products with these micro-contaminants?

A. Yes, there is. It's available from the Department of Agriculture.

By way of reference, I have one such publication, which again I can make available, published by W. P. Cochrane, et al, Journal of Chromatography, Volume 217, 1981, page 289 and this provides an analysis of a variety of dibenzo-dioxin type contaminants in 2,4-D products -- commercial products available in Canada and there have been a number of subsequent reports on the same subject.

Q. Dr. Ritter, what is the title of that one?

A. The title of the paper I just cited?

Q. Yes.

A. Determination of Chlorinated Dibenzo-para-dioxin Contaminants in 2,4-D Products by Gas Chromatography, Mass Spectrometric Techniques.

Q. If I could see that copy for one moment.

A. (handed)

Q. Dr. Ritter, just noting the date 1981, I presume it builds on the work of the paper that was prepared by Dr. Cochrane in 1980 which I filed and is now Exhibit 747?

A. That's correct.

Q. Okay.

MR. CASTRILLI: Mr. Chairman, if the Ministry wants to make appropriate copies of that available, I am content to have that as part of the record.

THE CHAIRMAN: Should we give it a number at this point?

MR. CASTRILLI: I'm content to do that as well.

THE CHAIRMAN: Exhibit 749.

---EXHIBIT NO. 749: Publication entitled: Determination of Chlorinated Dibenzo-para-dioxin Contaminants in 2,4-D Products by Gas Chromatography, Mass Spectrometric Techniques, W. P. Cochrane, et al, Journal of Chromatography, Volume 217, 1981, page 289.

MR. CASTRILLI: Q. Dr. Ritter, that Exhibit 749 comes hard on the heels of Exhibit 747, both in terms of numerology but also in terms of time.

Are there any other references that you have available or know about or could make available

with respect to Canada's ongoing examination of micro-contamination of 2,4-D products with dioxins and furans?

MR. CASTRILLI: A. Yes, to your last question, there has been ongoing efforts and I could most certainly make those available.

Q. Thank you. Dr. Ritter, just asking you to continue with what is now Exhibit 748, page 30. This is the rationale for EPA requiring greater analytical chemistry data. The rationale states that:

"Polyhalogenated dibenzo-p-dioxins or dibenzofurans may be formed during manufacture of 2,4-D and N-nitrosamines may be formed during manufacture or storage of 2,4-D. The Agency has identified these contaminants as being toxicologically significant. The Agency does not have sufficient data to determine the extent and significance of the contamination."

Is that an assessment that's equally applicable to Canada?

A. No, I don't think so. I think there have been a number of market analyses that have been done over the years. In fact, as you may be aware,

there are lawful limits for contaminant levels in commercial 2,4-D products available for sale in Canada and, of course, these limits cannot be exceeded. The limits refer to total contaminant level.

So at this time -- there are really two parts to this rational and, if I may, I would just like to briefly deal with them separately. One relates to the toxicological significance; the other relates to information about the concentration, if present, of these contaminants.

The answer that I have given you really relates to the second issue and; that is, the level of the contaminants, and I would say that in Canada there is certainly good information on the level of contaminants in commercial 2,4-D products that may be expected. And, as I say, there have been lawful limits that have actually been promulgated in Canada several years ago now.

With regards to the toxicological significance of the possible presence of these contaminants, again I think in my view that question has been dealt with satisfactorily and that the chemical which has been tested in a variety of toxicology studies and otherwise would have contained these contaminants.

And, consequently, if you like, this would have been a toxicology study in C-2; that is, the test animals, by whatever test procedure one is referring to, would have been exposed concurrently to both 2,4-D and the contaminant level. But because of the exaggerated doses that these studies tend to use, the exposure to the contaminant would have been at levels much higher than one might have expected under typical use conditions.

So I would say that with regards to the toxicological significance, that question has been dealt with to some extent by the nature of the toxicology protocols.

Again, without expanding any further, there is an extensive section on the possible contribution to overall risk that these contaminants may make in the Crump document and, again, the risks expected from these contaminants and from the overall product are very, very small.

Q. Dr. Ritter, the Crump document was written in 1986; is that right?

A. That's correct.

Q. The U.S. EPA registration standard that is now Exhibit 748 was published in September, 1988; is that right?

A. That's right.

Q. The existence of the Crump document, would that have been something that you were aware of in 1988?

A. I was aware of its existence in 1988, yes.

Q. Do you know whether EPA was?

A. I do not know, but I would be surprised if they were not aware of it.

Q. So notwithstanding their apparent knowledge of the Crump article, they were still prepared to write in September, 1988 that the Agency has identified these contaminants as being toxicologically significant, and you disagree that that situation applies in Canada; is that right?

A. That's correct.

Q. And on what basis do you disagree?

A. For the reasons I've indicated to you. There have been extensive analyses of 2,4-D samples in Canada over the last eight or nine years.

And in addition, in our view, the levels which have been established in regulation in Canada at which these contaminants may be present, we believe would be satisfactorily addressed through the normal conduct of the toxicology protocol.

Q. Are these in absence in the U.S.?

A. I don't know what's in presence or in absence in the U.S.

MS. MURPHY: And, if I might - I know this is becoming tedious, Mr. Chairman - but again, last evening my friend provided on request a complete copy of this document. I am, of course, entirely unable to assess whether there is anything in here that would further assist Dr. Ritter or whether there is anything in here that he needs, and I would suggest that he be certainly, at least, given the opportunity to look at it and make his own judgment, given that I can't discuss it with him.

THE CHAIRMAN: Would you require an opportunity, Dr. Ritter, to look at the entire document?

DR. RITTER: I would like it, yes.

THE CHAIRMAN: Okay. I think that's fair.

MR. CASTRILLI: Q. Dr. Ritter, do dioxins have an affinity for fats and proteins?

A. They have an affinity for fats.

Q. Fats but not proteins?

A. Primarily for fat, they're fat soluble.

Q. So they are capable of bio-accumulating?

A. They are capable of being stored in fat.

THE CHAIRMAN: Many of us have that affinity, Mr. Castrilli, the same for the bio-accumulation part of it too.

MS. CASTRILLI: Q. Can they also bio-accumulate?

DR. RITTER: A. We had this discussion the other day. I'm not sure that you and I necessarily share the same definition of what bio-accumulation means. If one is exposed to 1 milligram which is subsequently stored in body fat, that 1 milligram will not grow to anything larger.

I would need your assistance in helping me to understand your meaning of the word before I can answer the question.

Q. Are you familiar with a document entitled: Dioxins in Canada, the Federal Approach?

A. Yes.

Q. Produced by the Interdepartmental Committee on Toxic Chemicals, December, 1973?

A. Yes, I am.

Q. I have provided you with excerpts

from it; is that right?

A. Yes, you have.

MR. CASTRILLI: Mr. Chairman, I would ask this be made the next exhibit.

THE CHAIRMAN: 750.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 750: Excerpt of document entitled: Dioxins in Canada: The Federal Approach, produced by the Interdepartmental Committee on Toxic Chemicals, December, 1973.

MR. CASTRILLI: Q. Dr. Ritter, are you familiar with the Interdepartmental Committee on Toxic Chemicals?

DR. RITTER: A. I am.

Q. It's a committee that is coordinated by Environment Canada; is that right?

A. That's correct.

Q. Who are the other departments on the committee?

A. Health, Agriculture, Fish and Oceans, I believe.

Q. So Health and Welfare Canada is a representative on that committee?

A. That's correct.

Q. Okay. I would just like to refer you

to the first page of the document which says that -- at the top of the page?

A. Yes.

Q. "Dioxins are a group of 75 chemicals identified by the number and position of their chlorine atoms. The simultaneous use of dioxin(s) to mean the specific chemical 2,3,7,8..."

I will just say TCDD:

"one of 22 tetrachlorodibenzo-p-dioxins, as well as all 75 polychlorinated dibenzo-p-dioxins has led to some confusion."

And so for the purposes of this document, Dr. Ritter, can you confirm that the authors of the document use the term dioxins when they are referring generally to all 75 dioxins?

A. Yes. That was the point I tried to make a few moments ago in explaining the difference between what is commonly referred to as dioxins and what is specifically meant in reference to 2,3,7,8.

Q. And when the authors of this document mean 2,3,7,8-TCDD they in fact say it; is that right?

A. I wasn't a member of this committee, Mr. Castrilli, I really can't confirm for you what they

had intended to say.

Q. Well, just read the second to last sentence.

A. It indicates that where they will be referring to 2,3,7,8-tetrachlorodibenzo-p-dioxin they will refer to it as 2,3,7,8-TCDD.

Q. Thank you. Can I ask you to turn to page 8?

A. Yes.

Q. Under the heading: Environmental Concerns?

A. Yes.

Q. The third -- beginning with the third line down in the first paragraph under that heading:

"Dioxins..."

And by the definition used in this report that would be all 75 dioxins:

"...have...a much higher affinity for fats and proteins."

They go on to note:

"Dioxins have been detected in some samples of fish...human tissue, bird eggs..." et cetera.

Just going back to the first sentence:

"Dioxins have...a much higher affinity

for fats and proteins."

Do you agree with that?

A. "Than they do for water", yes. Higher is a comparative term. They're certainly more soluble in fat than they are in water; absolutely, no question.

Q. Turning to page 9 under: Fisheries Concerns:

"Dioxins are readily bio-accumulated..."

Do you agree with that assessment?

A. That sentence, Mr. Castrilli, is with reference to fish and I'm not really prepared to comment on whether or not dioxins do or do not bio-accumulate in fish, I don't know.

Q. Dr. Ritter, at the bottom of page 8 there is an indication that dioxins have been found in human tissue. Is that some indication that they bio-accumulate?

A. No, that's some indication that exposure has taken place. I indicated to you a moment ago that if you are exposed to 1 milligram and one finds 1 milligram in your fat, that's not a measure of bio-accumulation, that's a measure of exposure.

In the example which I am citing there would have been 100 per cent absorption. If you were

exposed to 1 milligram and you retain 1 milligram there is 100 per cent absorption, but it's not a measure of bio-accumulation.

Q. Would you agree with me, Mr. Kingsbury, that if dioxins and furans bio-accumulate their fate in the environment is an independent factor to consider when 2,4-D is sprayed?

MR. KINGSBURY: A. Is an independent factor to consider. You are saying that it warrants independent -- being studied as a separate issue?

Q. It warrants at least being mentioned; would you agree?

A. It would seem that if significant quantities of dioxins are present in the formulations that are being applied it would be a consideration, yes.

Q. Did you or the authors of ESSA in preparing the ESSA report advise the Board of the potential for dioxins to bio-accumulate when you discussed 2,4-D?

THE CHAIRMAN: Well, let's find out first if Mr. Kingsbury is of the same view as Dr. Ritter on what bio-accumulation means in terms of dioxin.

MR. KINGSBURY: The ESSA Document has provided its own definition of bio-accumulation found

on page 17 of that document.

Basically it says a pesticide is said to bio-accumulate if it may be found in biota. I think that's consistent with what Dr. Ritter has said about being exposed to the material.

MR. CASTRILLI: Q. Mr. Kingsbury, in what is Exhibit 4 there is a generic statement that herbicides do not bio-accumulate to toxic levels in wildlife, et cetera, et cetera.

MR. KINGSBURY: A. And as when I was giving my direct evidence in dealing with this issue I cautioned the Board that they would no doubt find a variety of uses of the term bio-accumulate throughout the scientific literature.

What the ESSA Document -- or what the EA Document says -- Exhibit 4 says, do not bio-accumulate to toxic levels in wildlife and I believe that is, consistent with my direct evidence and my understanding of the assessment in this area of environmental effects.

THE CHAIRMAN: Do you mean by that last statement that the pesticides do not -- are not found in toxic levels in wild animals or --

MR. KINGSBURY: Are not found in animals at toxic levels.

THE CHAIRMAN: At toxic levels. Or do you mean that the pesticides do not increase in animals to toxic levels? In other words, if they were exposed at 1 milligram or something and over a period of time the 1 grew to --

MR. KINGSBURY: Grew to a level which exerted a toxic influence.

THE CHAIRMAN: That's right.

MR. KINGSBURY: I guess basically this captures both ideas and in doing that it expands, you know, the notion of bio-accumulate into an area that's talking about other things such as bio-concentration or bio-magnification.

MR. CASTRILLI: Q. Mr. Kingsbury, I would appreciate it if you could, over the evening, indicate where in the ESSA Document you indicate that 2,4-D is capable of bio-accumulating or, more importantly, that dioxins are capable of bio-accumulating or indeed that there were even dioxins in 2,4-D. You can take the evening to do that.

A. You would like to know where in the ESSA Document those issues are dealt with?

Q. That deal with the issue of dioxins in 2,4-D and dioxins bio-accumulating?

A. Okay. I will undertake to do that.

MR. CASTRILLI: Mr. Chairman, can I have an indication of how long you wish to sit today?

THE CHAIRMAN: Well, I don't think we want to go beyond 5:30 because we have to clear this room for the hotel management, but we were hoping, if it's convenient, to go that long.

MR. CASTRILLI: I will find a convenient place to break around that time.

THE CHAIRMAN: Very well.

MR. CASTRILLI: Q. Dr. Ritter, you have indicated that there are, in the analyses that have been done in Canada, no -- to your knowledge, there is no contamination of 2,4-D with the other dioxin that's referred to in what is now Exhibit 750; that is, the 2,3,7,8-dioxin; is that right?

DR. RITTER: A. That's correct.

Q. Right. You are aware that that particular dioxin has been found in 2,4-D by chemists in Germany; is that right?

A. Yes, I am aware. Actually we have communicated with that chemist because we were quite interested in that observation and I have some record here of the events that surround that.

MR. CASTRILLI: Perhaps before you do that, we can introduce as the next exhibit the article

we are both talking about so that everyone is playing with the same shopping bags.

Mr. Chairman, I would ask that this next article be made the next exhibit.

THE CHAIRMAN: Exhibit 751.

MR. CASTRILLI: (handed)

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 751: Article entitled: Determination of 2,3,7,8-tetrachlorodibenzo-p-dioxin in commercial chlorophenols and related products by H. Haganmaier, 1987.

MR. CASTRILLI: Q. Dr. Ritter, you have a copy of this; is that right?

DR. RITTER: A. Yes, I do.

MS. CRONK: Sorry, Mr. Castrilli, could you give me the author, please?

MR. CASTRILLI: Sorry. The name of the author is Haans-Paal Haganmaier and I will give you the cite from the article in a moment.

Mr. Chairman, the reproduction is not the best quality. I'm just going to read into the record the name of the article and, more importantly, the citation.

The title is clear enough, it's: Determination of 2,3,7,8-tetrachlorodibenzo-p-dioxin in commercial chlorophenols and related are products by

Haans-Paal Haganmaier.

The article was published in 1987 in Volume 323, pages 603 to 606 of the F-r-e-s-e-n-i-u-s A. Analytical Chemistry, a German publication I gather.

DR. RITTER: Would you like me to proceed with your question, Mr. Castrilli?

MR. CASTRILLI: Q. I'm sorry, let me just ask a couple of questions and then we can develop into this matter.

Dr. Haganmaier found a German sample of 2,4-D to contain 6.8 parts per billion TCDD; is that right?

DR. RITTER: A. That's correct.

Q. And that's actually referred to at page 603 of Exhibit 751, the left-hand column?

A. It is not reproduced very well, but I'm certainly prepared to verify that the original manuscript says exactly that.

Q. Okay. And the article also indicates, the same page, that 2,3,7,8-TCDD could be shown to be present in all samples of 2,4-D?

A. Yes, that is what he says.

Q. And Haganmaier notes - I'm now referring you to page 606 which is the last page, referring to the second full paragraph on the left-hand

side of the page that:

"In the case of the 2,4-D sample, a 2,3,7,8-TCDD concentration of 6.8 parts per billion was found."

Is that right?

A. Yes.

Q. Now, I understand generally that Haganmaier was doing -- was employing a new procedure that allows a determination of the presence of 2,3,7,8-TCDD in the presence of a large excess of other dioxins and furans; is that right?

A. I'm not an analytical chemist, I would prefer not to comment on precisely what Professor Haganmaier's intent was in carrying out this work, but we have identified the source of his material which perhaps may be of greater interest to you.

Q. Well, let me just ask you: Were you aware of the findings contained in this report?

A. Yes, I was.

Q. And is this a factor one should take into account?

A. Absolutely, and that is precisely why we pursued it to the extent that we did.

Q. And you would agree that this is a matter that Canada should satisfy itself can be

remedied before permitting the use of 2,4-D in Canada?

A. We should and did.

Q. Can you indicate what it is you did?

A. Yes. Upon becoming aware of the fact that this article existed, we wrote to Professor Haganmaier in Germany and asked him to identify for us the source of his material.

We were interested in his observations on that matter because not only had our own Laboratory Services Division never been able to detect 2,3,7,8 in any 2,4-D sample in Canada, which is noteworthy because in 1980 when we first started these analyses, Canada was only one of two or three centres in the world that was capable of analysing 2,3,7,8 to the levels of detection which we had.

And, in addition, you might also want to note, in the 1988 U.S. registration standard document which you distributed this afternoon, Exhibit 748, the Americans made exactly the same observation.

I refer you to page 10 in the last full paragraph on the page, last sentence and it says:

"While 2,3,7,8-TCDD has not been found in 2,4-D at levels analysed to date..."

So we found Professor Haganmaier's work interesting because although we, using state-of-the-art

equipment over eight or nine years have never detected it, and the Americans have also never detected it, he did.

Consequently, we wrote to him and we were able to identify that the source of 2,4-D which Professor Haganmaier used in his experiments originated with a commercial chemistry organization called Vertak which closed around about 1978 in Germany and that the 2,4-D which he sampled, in fact, was not a commercial preparation of 2,4-D at all but may have been deliberately contaminated in order to allow Professor Haganmaier to conduct his work.

Part of the difficulty which Professor Haganmaier encountered was that he could not find the 2,4-D sample which had TCDD in it.

We subsequently followed the sale of Vertak to Sigma Chemical in the United States and we have been unable to locate any other source, including the original source, used by Professor Haganmaier to confirm that the TCDD would be present in any other sample.

But I would ask you to note that the sample which he used was a laboratory grade sample, not a commercial sample of 2,4-D available for sale in Canada or in the United States. So that I don't think

Professor Haganmaier's observations are in any way contradictory to the statement I made about TCDD levels in Canada or to the statement the Americans made in their position document on the same topic.

Q. You refer to correspondence between yourself and Haganmaier. Is that something you could make available to this Board?

A. I'm not sure.

Q. Would you undertake to find out?

A. Yes.

THE CHAIRMAN: Was this information that Canada found out shared with the United States, on tracing this particular lab sample with Vertak and then back to another lab in the States?

DR. RITTER: I did not, but Sigma Chemical - I may have introduced some confusion here - Sigma Chemical is not in the pesticide business, Sigma Chemical produces laboratory standards. They have a catalogue of laboratory re-agents, so that a commercial user of 2,4-D would not be buying 2,4-D from Sigma. They sell it in 1-gram lots.

THE CHAIRMAN: I guess what I'm asking, Dr. Ritter, is that Canada was concerned when they learned about this report--

DR. RITTER: Yes.

THE CHAIRMAN: --and tracked it down. Are you aware that the United States, which presumably also would have been concerned, tracked it down as well?

DR. RITTER: I don't know.

THE CHAIRMAN: You don't know that.

DR. RITTER: And I certainly personally did not make direct representations to the Americans about either our finding of this paper in the literature or our subsequent follow-up to it.

I should say that Dr. Reidl who is on my staff is a German by birth and in fact had on a number of occasions a number of phone discussions with the Germans about the nature of this work and much of what I'm giving you is a result of those phone discussions which went on between our division and our counterparts in Germany.

THE CHAIRMAN: Why wouldn't Canada, as a matter of course, share this kind of information immediately with the U.S. EPA if you in fact were aware of reports issued by them which came to the original conclusions that Canada did, that there was none present in commercial products, when you happened to track it down and satisfied yourself that this wasn't a commercial grade, why wouldn't your agency, as a matter

of course, pick up the phone or send a letter to your American counterparts so that they would have the benefit of that kind of information?

Obviously they would be interested, obviously the products that are on the Canadian market in general emanate from the States originally, perhaps in different formulations. Why wouldn't you share this?

DR. RITTER: The best I can offer, Mr. Chairman, will be an excuse. I suspect that had the disclosure suggested the possibility of an adverse effect; that is, if it were the converse, had this paper suggested that indeed there was TCDD in commercial grade samples of 2,4-D, I think we would have felt considerable impetus to communicate that immediately.

Because this was essentially a non-event...

THE CHAIRMAN: But they might be spinning their wheels; would you not agree, needlessly to try and duplicate much of what you have done?

DR. RITTER: Yes.

THE CHAIRMAN: And, therefore, they could be saved that expense and aggravation, if I can put it that way, and benefit from what you had found out and

the reciprocal, presumably, would hopefully also be true; they would do the same for us should they find out something which they would surmise would be of conern to us.

I mean, I'm just suggesting that perhaps the policies exercised by the various agencies around the world, particularly the ones we cooperate with on a regular basis, should perhaps be revised to share this information in a more readily available fashion.

Would you not think that would be a good idea?

DR. RITTER: I think it would be a great idea. I have no legitimate explanation. As I said, the best I think I can offer at this point is an excuse.

But I might just add that there are a number of people on my staff who would be more directly involved in the day-to-day work, the continuing evaluation of 2,4-D and its contaminants. It is possible that that communication has been made. I didn't make it.

But I will, at the same time that I am trying to trace down some of this background information, just out of curiosity I will find out if in fact we did communicate our experiences with this to

the Americans.

THE CHAIRMAN: Thank you.

MR. CASTRILLI: Q. Just for the record, Dr. Ritter, in relation to 2,3,7,8-TCDD, it does accumulate in the fats of animals; is that right?

DR. RITTER: A. TCDD can be found present in human fatty tissue, yes.

Q. All right. Dr. Ritter, can you confirm that immune suppression effects testing is not required for pesticide registration in Canada?

A. Yes, I indicated that yesterday. It's not required anywhere on earth.

Q. And would it be fair to say that a properly functioning immune system is essential for protection against diseases, cancer and allergies in general?

A. I can't answer that question, Mr. Castrilli. You are asking a very, very complex question and it's impossible to answer it with a simple yes or no.

Q. Are you aware of studies that show that the effects of polychlorinated dibenzo-dioxins can include immunologic fluctuations?

A. Yes.

THE CHAIRMAN: You indicated yesterday;

did you not, it was a protocol problem essentially?

DR. RITTER: Yes. The question which Mr. Castrilli just asked, for example, as to the impairment of some immune function with dioxins is certainly true. As to the role that that impairment may play in overall immunal competence is an entirely different question.

One can isolate specific protocols that will show a particular effect, but one is, particularly with immunotoxicology, at odds to put the significance of that effect into some sort of a meaningful context.

So certainly there have been reports suggesting immuno -- an immuno compromise in association with exposure to some of these contaminants, but I know of no concerted overall study which has actually demonstrated the contribution of these isolated events to overall immuno competence.

MR. CASTRILLI: Q. Dr. right Ritter, are you aware that because of the lack of data on the neurotoxicity of 2,4-D the U.S. EPA has required additional data on this issue?

DR. RITTER: A. Not due to the lack of neurotoxicity, Mr. Castrilli.

2,4-D is not a member of a class of chemistry for which neurotoxicity testing would normally be required. You may recall during my

presentation I indicated that in Canada we routinely require neurotoxicity testing for organophosphorous and frequently for carbamate type chemicals. 2,4-D falls into neither category.

The Americans became interested in examining the potential neurotoxicity of 2,4-D because of a number of poisonings which have taken place at extremely high doses and they felt that this was an issue worthy of pursuing.

But indeed, Mr. Castrilli, we noted a similar effect in the work we did for the World Health Organization some years ago. So I would say that that observation is not new and certainly not been made for the first time by the Americans, but it only takes place under conditions which approach suicide.

Q. Okay. Let's turn to page 11 of Exhibit 748. Sorry, do you have the page?

A. Yes.

Q. Item 4 on that page.

A. Yes.

Q. I'm just waiting for the Board to find the document. The EPA notes that:

"Several instances of accidental human poisoning with 2,4-D through dermal exposure, which has resulted in severe

neurotoxicity, have been reported."

And it goes on to note:

"Data are required to assess the neurotoxicity of 2,4-D."

A. That's correct.

Q. I'm sorry, just turning to page 15 of the same exhibit, top of the page, U.S. EPA -- I am sorry, under the heading: Neurotoxicity Studies.

A. Yes.

Q. The document indicates that:

"The only available neurotoxicity study, one performed with an amine salt of 2,4-D did not show neurotoxic effects. This study, however, has significant deficiencies and cannot be used for evaluation of the chemical's neurotoxicity."

And they note:

"Additional data are required."

Then if I could just refer you before I ask you a question, to page 86.

A. Page 6?

Q. Sorry, 86, or under the heading of Special Testing.

A. Yes.

Q. Neurotoxicity - Dermal.

A. Yes.

Q. You will see under the third column on the page: Does EPA have data to satisfy this requirement. And the answer is, no for acids, no for amines, and no for esters. Do you see that?

A. Yes.

Q. And two columns over: Must additional data be submitted. The answer with respect to acids, amines and esters is yes, yes and yes.

A. Yes.

Q. And just for clarity sake, the footnote reference to 14 is on page 88 and outlines what the protocol is that must be submitted in relation to those studies before they are done.

And just referring you back to page 86, it's an indication that studies have to be -- the time frame for submission is 12 months. Do you know whether those in fact have been submitted?

A. No, I do not. But I would suggest, Mr. Castrilli, that this requirement represents a rather significant intellectual challenge because the protocols currently available within toxicologic practice are restricted to evaluation of the neurotoxic potential of organophosphorous and carbamate type

pesticides and that the evaluation of classes other than those two by conventional protocol would be a relatively meaningless exercise.

Q. I see. Continuing to page 29 or the heading -- or excuse me, it's Item 18.

A. Yes.

Q. "The Agency is requiring special Neurotoxicity studies."

And there is a rationale:

"Several instances of accidental human Poisoning from dermal exposure to 2,4-D formulations which resulted in neurotoxicity have been reported. Data are required so that the Agency can evaluate the chemical's neurotoxicity."

It's clear that the Agency is moving ahead with requiring this additional data in the United States. Is it your position that Canada is not requiring such data?

A. That's correct, we have not made a requirement for such data.

Q. And Canada does not regard that as a data gap; is that right?

A. That's correct.

Q. Can you advise the Board why that is

the case?

A. I have attempted to do that in the last five or ten minutes.

To the best of my knowledge there is no protocol which would satisfactorily be able to address the neurotoxic potential of either an organophosphorous or carbamate type chemical.

In addition, if you would -- I don't think that the full evaluation of that neurotoxicity -- the human neurotoxicity experience is expanded upon in this abbreviated document which you have provided. I'm not even sure that it's expanded upon in the fuller document which you haven't provided.

But this relates to three cases specifically in the United States in which symptoms of neurotoxicity were observed in association with exposures to exceptionally high levels of 2,4-D.

In my view it's not very productive to require the development of a protocol which may not even be able to assess the end point in question for the assessment of an effect which is not expected and that is why we have not imposed this requirement nor do we expect to.

I should perhaps add for the benefit of the Board, Mr. Castrilli, that when these registration

documents are issued, as we discussed yesterday with glyphosate, they are if you like initial request by the agency to which they most certainly welcome comment and opinion on the validity and utility of studies which they are requesting.

So although they had indicated that this is a data deficiency in September, 1988 I don't think it would be reasonable to conclude that they will absolutely require that. It's entirely possible that one could make some submissions to the agency in which they would change their views on the need for such a study.

The example that I gave you yesterday was in the case of glyphosate where the agency, it appears, now has changed its opinion on the need and utility of repeating a number of studies.

Q. And to your knowledge, has EPA changed its opinion on the utility of the neurotoxicity studies?

A. I have no knowledge of it one way or the other. I simply have no knowledge of it.

THE CHAIRMAN: Dr. Ritter, have there ever been any cases in Canada of suspected neurotoxicity from 2,4-D?

DR. RITTER: None that I'm aware of.

THE CHAIRMAN: If there were would you be attempting to go the same route.

DR. RITTER: I think if there were cases of neurotoxicity in Canada we would be attempting to discover the basis for those poisonings. It would still be intellectually very difficult to test the chemical by the means with which we have, because the methods we have are insensitive to this class of chemical.

There is no point in - I don't want to belabour this - but there is really no point in subjecting a chemical; it's a waste of experimental animals, there is no point in subjecting a chemical to a study which is incapable of detecting the effect for which you are looking.

And the conventional protocol for neurotoxicity is restricted to organophosphorous and carbamate agents, and for good reason. The protocol involves depression of cholinergic function and those two classes of insecticides are known to be associated with that possible activity. Consequently, the protocol is sensitive to detecting effects on that parameter.

This chemical is not associated with that kind of an effect.

THE CHAIRMAN: Well, I guess the question is: Why haven't the U.S. scientists or why hasn't the EPA come to the same conclusion?

DR. RITTER: What I'm suggesting, they may come to the same conclusion and put out this request for neurotoxic data.

It's entirely conceivable that they will or already have been approached with the suggestion that, although it is a good idea in principle, it can't really be executed from a practical point of view.

THE CHAIRMAN: All right. Is there a difference in Canada's methodology when faced with a problem like this, would you request a study that, in advance of requesting it, you don't feel the technology is there to really produce a meaningful answer at the end?

DR. RITTER: No, but if we had instances of poisoning in Canada, we might certainly request of the industry that they attempt to develop a protocol by which we might assess that potential hazard.

THE CHAIRMAN: OKay. So you would want, in effect, to brainstorm the industry to see if they can come up with a protocol that you might agree would be effective?

DR. RITTER: Yes. And I take the EPA

suggestion to be exactly that in this context, because you will note that where other data deficiencies are identified, they specifically identified a kind of study they would like repeated. They refer to a two-year cancer bioassay, for example.

They have not done that here; they say that there is neurotoxicity data missing and really provide no guidance in the document at all as to what kind of study they would like. Which leaves me to believe that they really didn't have a clear idea in mind as to what they were looking for, but felt they'd like to see something which is designed to address this issue.

And I certainly agree that that's an admirable idea, particularly if they've had cases of human poisonings. We have none, or none that I'm aware of at least.

THE CHAIRMAN: And what is the bottom line? Suppose the manufacturers come up and say: We can't really design something that we think will work, I take it the agency either has to change its mind or dig in and deregister the product. Are those the two the choices available?

DR. RITTER: Essentially, yes.

MR. CASTRILLI: Thank you.

MR. MARTEL: You haven't got a protocol, but could you work one out if push came to shove, because all of the others at one time didn't have a protocol and you developed -- someone develops it for a variety of reasons, and if push came to shove, if you were pushed to examine that, could you develop a protocol for it to detect what it is that is occurring?

DR. RITTER: I'm not sure that one could develop a protocol today which would be useful in assessing potential human hazard.

I'm sure that one can develop a protocol, an experimental protocol which will test something ostenibly that we refer to as neurotoxicity for 2,4-D. As to whether or not that protocol would actually be useful in predicting neurotoxic outcome in man, I don't think that such a protocol could be developed today.

The neurotoxicity protocols which we have in place are designed to look at peripheral nerve damage in association with agents that interact with the cholinergic system.

THE CHAIRMAN: Sorry, what's that last word you are using?

DR. RITTER: Cholinergic.

THE CHAIRMAN: Cholinergic.

DR. RITTER: Depression of cholinesterase

which is an enzyme -- cholinergic function is the transmission of messages between nerve endings cholinesterase is the enzyme which is responsible for chewing up, if you like, the chemicals involved in that neural transmission.

So that agents such as organophosphorous insecticides which may serve to depress the level of cholinesterase activity, the level of that enzyme would also serve to depress the rate at which these neural transmissions may take place and if they affect a critical function, may lead to death.

There is a wide class of therapeutic drugs which are based on exactly that principle. For example, there is a whole class of drugs used in the management of clinical asthma which are based on depression of cholinesterase activity in the lung. And there are other examples, both in therapeutics as well as in toxicity.

Because the pesticides in question are known to affect that mechanism, that mechanism is useful for assessing that potential, but unless both those conditions can be met, unless you have a chemical which affects the cholinergic activity, assessing it by a protocol which only looks at cholinergic activity is really not very productive.

In fact, it may be misleading because if you were to test it in a conventional protocol and if it were to achieve no adverse effect at all, you could walk away with the impression that it was not neurotoxic, when what you really meant was that the neurotoxicity could not be assessed by this protocol. Those are very different results and lead to very different conclusions.

And that's why, by convention, where the world requires that neurotoxicity be assessed - and that's not restricted to Canada, that's world-wide - wherever such requirements are in place, the requirement is restricted to chemicals of that class. And to be fair, largely restricted to chemicals of the organophosphorous class, not frequently to chemicals of the carbamate class.

So, Mr. Martel, if push came to shove -- to answer your question, if I were a consultant rather than a federal public employee and you had enough money, push I think would come to shove. But I don't think the technology is there to allow a meaningful protocol to be developed in that context right now.

MR. CASTRILLI: Mr. Chairman, I just have one further brief area and I think we can close for the day.

THE CHAIRMAN: Okay.

MR. CASTRILLI: Q. Page 14 of Exhibit 748, Dr. Ritter.

DR. RITTER: A. Yes.

Q. At the bottom of the page, Mutagenicity and Metabolism Studies, an indication that the U.S. EPA as of September, 1988 has no data -- or indicates that there are no data available on the mutagenic potential or metabolism of 2,4-D. Sorry, do you have the page?

A. Yes, I do.

Q. And just referring you to page 86, the same document.

A. Yes, I have it. I'm sorry.

Q. Under the heading of: Mutagenicity Testing, there are three categories; gene mutation, structural chromosomal aberration and other mechanisms of mutagenicity, and with respect to all three categories -- I guess it's generic categories of 2,4-D, acid, amines and esters, the answer to the question: Does EPA have data to satisfy this requirement, as of September, 1988, the answer is no in all cases?

A. That's correct.

Q. And with respect to the heading: Must Additional Data be Submitted, the answer is yes in

relation to all nine categories?

A. Yes.

Q. Do you see that? That was the situation in September, 1988. Did Canada lack those studies in September, 1988?

A. I can't tell you if Canada lacked those studies in September, 1988 because quite frankly I don't recall, but the metabolism studies to which you referred on the earlier page -- and I have lost the page now, was it 9?

Q. It was 14.

A. 14. That certainly at this point in time is incorrect. There are extensive metabolism data available, there are additional metabolism studies that are underway and there are mutagenicity studies that are available. Indeed, the mutagenicity studies have been referenced by a number of other sources.

So I certainly can't comment as to whether or not this was a situation in Canada in September of 1988. I can comment as to the fact that it's not the situation now and that, in fact, is a matter of public record because the 2,4-D metabolism studies are discussed at some length in the United States Federal Register Notice.

Q. What date is that notice?

A. I don't know. If you are asking: Does it predate or postdate September, 1988 I'm not sure, but I think perhaps, Mr. Castrilli, what's really important is not whether or not we had it then, but whether or not we have it, and the answer is we do.

Q. When did you have it?

A. There were metabolism studies that came in --

Q. Sorry, let's talk about mutagenicity first.

A. I would have to check the record on the individual studies. There is -- the approach taken to mutagenicity studies, at least in Canada, is hierarchical in that mutagenicity studies are designed to tell us a little bit about the capacity of a chemical to interact with the genes and with the genetic material of the cell and there are a variety of test protocols which we use to evaluate that potential.

There is also a variety of test systems and they include yeast, for example, and bacteria as well as in some case there may be additional fungi that are used. We also look at the ability in cultured human cells and cultured mammalian cells as well as in intact animals.

Now, the reason I say the approach or the

logic behind the hierarchical approach in Canada is that it isn't a matter of weighting, we can have 10 positive results and 1 negative result and consider it to be negative, because if all of the positive results -- if all of the adverse results are from species like yeast and bacteria and fungi, but the negative result is from humans, then obviously we are going to rely on the human experience.

So that in order to answer your question with absolute precision, I would have to verify not only that we have mutagenicity studies on file, but precisely of what type and what the individual study results are before I can tell you as to whether or not we consider that we have a mutagenicity deficiency in the strict sense of the word.

That these studies may not have been present in September of 1988 may or may not have any biological relevance to us.

Q. Let's just begin with the three categories of tests that are listed there: gene mutation, structural chromosomal aberration and other mechanisms of mutagenicity.

Are those generally the three categories that Canada requires mutation testing to deal with?

A. They are included in the categories

that we require, yes.

Q. Okay. And would Canada normally -- let me say, does Canada specifically require such tests in the acid, amine and ester versions of 2,4-D, if I can put it that way?

A. That's an interesting question. We require that the testing be conducted not only on the mutagenicity but, indeed, that all of the testing, the cancer testing, teratology, reproduction, all of the testing be conducted on the most relevant form of the chemical.

Now, in the case of acid, amine and ester it is interesting to note here that the Americans have indicated that they're missing data on all three and are requiring data on all three, because it was the Americans that argued that all three are equivalent to the acid; that is, on exposure to either the amine or the ester both are rapidly converted to the acid. So that, in effect, we are all exposed to the acid only rather than to the acid, amine and ester.

Indeed, it was the Americans some time ago that decided that the 2,4-D cancer studies need only be done with the acid, even though it was the amine that was being sold in the United States. If you check your notes in the 2,4-D registration standard you

will note some discussion on the equivalency -- the bio-equivalency of the acid, amine counterparts.

So I can't provide you with a great deal of guidance as to why they are requiring individual studies on these individual components when they have gone to some length to argue that they are in fact biologically equivalent.

Q. Well, let me ask you the question so that I understand the answer. Does Canada have mutagenicity testing on the ester formulations for 2,4-D?

A. I can't tell you at this moment if we do or do not and I'm not sure that I could tell you even if I could verify it.

Q. Sorry, say that again? If you knew you couldn't tell me whether you did?

A. That's correct. I'm saying, I'm not sure I could tell you if I did. As we have discussed before, I'm not clear on the extent to which I can indicate our status of proprietary information.

Q. Even as to the presence or absence of a study without identifying it?

A. Well, if I indicate the presence or absence of a study, I think I have violated that proprietary consideration.

MS. CRONK: Mr. Chairman, I hesitate again to rise to my friend's cross-examination, but for the record and in an effort to be of assistance to the Board, there is actually information before you on these very studies in a number of the other studies that Mr. Castrilli has been talking about, in both the Crump document and the MOE carcinogenic studies.

There is a summary of, for example, the mutagenic effects and mutagenicity studies done with respect to 2,4-D in Crump and there is a discussion of it in the MOE one.

And many months from now when we come to the next opportunity that I will have to address this, many of the other studies that he's put to you are dealt with in those documents as well, but I wouldn't want the impression left, because of some proprietary information limitation, that that couldn't be clarified for the Board. There is evidence before you now.

MR. CASTRILLI: Mr. Chairman, just so we can be clear where I'm coming from on this. The Crump report is a 1986 report, the expert panel report is a 1987 report, both predate by a considerable period of time the issuance of this September, 1988 registration standard document and I think it's reasonable for the Board to take the view that EPA knew about the

existence of Crump and what Crump cites and EPA knew about the existence of what the MOE panel cites and, notwithstanding the existence of those two documents and the contents therein, their conclusions with respect to mutagenicity testing and the status thereof are that as of September, 1988 EPA did not have adequate data with respect to those three categories of tests.

MR. CRONK: I make no submission to you now, sir, as to the weight that should be attached to the reregistration document from the U.S. EPA authority on 2,4-D or indeed the others, but I simply point out that the statement that Mr. Castrilli cross-examined the witness on indicate -- was a statement there was no data available on the mutagenic potential for metabolism of 2,4-D. The witness confirmed that that is what the document said.

There then followed a series of questions that related to: Well, what information is there in Canada. And I point out to you, sir, that there is data before you, what weight you wish in the end to attach to it is an issue.

There is data before you on both of those matters already in evidence, some of which is Canadian in origin.

MR. CASTRILLI: Mr. Chairman, not to belabour this point that is becoming belabourable, the category on page 86 is: Does EPA have data to satisfy this requirement.

I presume what they mean by that if it's not adequate for their purposes of their requirement, whether or not they have something called a mutagenicity study is completely irrelevant.

So the existence of an inadequate study hardly helps my friend nor Dr. Ritter. And what I want to get at is: Does Canada have what EPA says it did not have in September, 1988.

And surely that is a question that can be answered by this witness.

MS. CRONK: I'm not objecting, sir, to the question.

DR. RITTER: I have already answered half the question in that I have indicated to you that the statement with regards to metabolism is factually incorrect. We have metabolism data on 2,4-D and have had it for some time.

Indeed, at the expense of being inaccurate, I will say that we had it at the time that this publication appeared and that the Americans did not have it or didn't consider it acceptable for their

purposes. I will not even venture to try to explain why they came to that conclusion, I have no idea. We did and we do have it now and there is additional metabolism data which is underway.

I'm prepared to tell you that without consideration of proprietary interests because the statement I have just made is a matter of public record. The presence of the metabolism study and indeed an abbreviated review of that metabolism study is in the public record. It has been published by the Environmental Protection Agency in the United States Federal Register and that publication, quite frankly, I think pre-dates this document.

So why would they say they don't have metabolism data which they in fact reviewed a year earlier I don't know, but I can make that Federal Register notice available, that's no problem.

THE CHAIRMAN: In addition, you are indicating that Canada has mutagenicity studies?

DR. RITTER: Yes.

THE CHAIRMAN: And has had for the last two or three years, in any event, and you are not indicating exactly what compounds of 2,4-D those studies deal with; is that what you're saying?

DR. RITTER: That's correct.

THE CHAIRMAN: That you feel may be proprietary information, even to reveal that?

DR. RITTER: Yes.

THE CHAIRMAN: Okay.

MR. CASTRILLI: Mr. Chairman, perhaps we can take this matter up in the morning. We have reached five -- actually we are past 5:30.

THE CHAIRMAN: All right. Now, you indicated earlier, Mr. Castrilli, you wanted to have a brief discussion as to a starting time tomorrow.

MR. CASTRILLI: Mr. Chairman, to ensure that I finish tomorrow, I would like to suggest that we start at 8:30.

THE CHAIRMAN: Very well. We will adjourn then until 8:30.

Okay.

---Whereupon the hearing adjourned at 5:30 p.m., to be reconvened on Wednesday, August 16th, 1989, commencing at 8:30 a.m.